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Marine Steam Engineering

Recent Developments of Steam Engineering Practice and Its Future Outlook—The Case of the Water Tube Boiler

By Theodore Lucas

NOT only in the field of using steam in modern and improved engines are recent developments pointing toward higher efficiencies, but also in the field of producing steam are signs rapidly multiplying that point toward boiler construction of economic superiority both in first cost as well as cost of operation.

The last 20 years of marine steam engineering have the fact well established that watertube boilers, while new comers in the field of steam generation, have undoubted merit and decided superiority over the older cylindrical Scotch or locomotive boilers, principally in the direction of greater lightness, greater ability for quick steaming and for carrying the highest practical pressures without excessive weight and last but not least also of reduced first cost.

There are, however, drawbacks against the employment of watertube boilers principally of commercial nature, that so far have prevented the average merchant steamer from departing from the old and tried Scotch boiler as the real representative of this class of shipping. More so has the Scotch boiler been able to hold its own as quite efficient systems of moderate forced draft have enabled it to increase its steam and power output quite materially above that of the practice of earlier periods and decreasing at the same time the relative coal consumption.

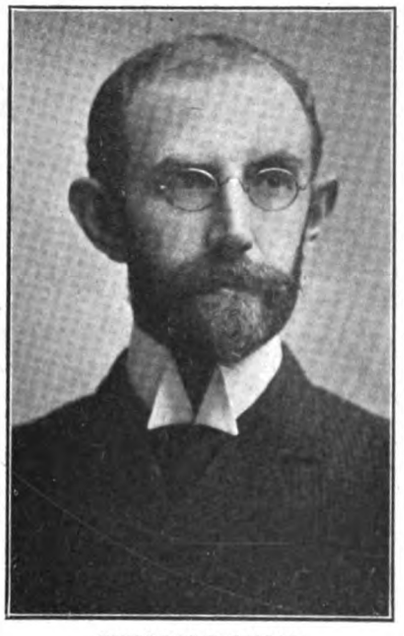
The drawbacks that made commercial failures of the several attempts of introducing small or large-tube watertube boilers into the merchant marine on a large scale can be classified mainly under two heads:

1. Necessity of keeping the water level of the steam drums practically constant at the right height by accuracy and care in water tending.
2. Necessity of keeping the steam pressure steady by accuracy and care in firing.

A watertube boiler with its relatively small water contents is naturally quite sensitive in the above two points, as any sudden demand for steam by main or auxiliary engines must be immediately followed by increased water supply as well as more active combustion and evaporation.

It was in these points that fireroom labor, not highly skilled, and unused to so painstaking a task, fell short of that degree of accuracy that would have made a success of watertube boilers at an earlier date.

In these two points the Scotch boiler particularly excels and is remarkably indulgent in its demand upon the attention of the operating force. It is almost automatic in its



THEODORE LUCAS.

Theodore Lucas was born in Germany in 1867 and received his initial training in ship building and marine engineering in Hamburg. He later worked on some of the war ships in the Germania ship yard in Kiel and followed this experience with a course at the Polytechnicum Charlottenburg, Berlin. After serving in the German army he went to England and later came to the United States. He has been associated at various times with Charles P. Willard & Co., Chicago, the Dubuque Iron Works, Dubuque, Ia., S. F. Hodge & Co., Detroit, and with a number of eastern ship yards, notably Dialogue & Sons, Camden, N. J., and Cramp's, Philadelphia. He is the author of "Lucas' Questions and Answers."

*This is the second of the series of articles on marine steam engineering practice and its future outlook by Mr. Lucas. The first article was published in the November, 1912, MARINE REVIEW.

action of furnishing quickly more steam from the very large body of heated water and even a severe drain will make only a small impression upon the very large water surface that already in a small depth represents large power and steam volume.

It is in these two points that the watertube boiler has to be improved, at least approaching the ease of operation, reliability and steadiness of service of the Scotch boiler before it can hope for largely extended or even exclusive introduction into the service of practically all ships where steam machinery has still advantages over internal combustion engines.

The pressing question of the day is for steam machinery to meet the competition of the internal combustion engine. This can be done only by reducing first cost, weight of installation, cost of operation in fuel as well as labor and depreciation and interest.

It is fortunate that recent developments in the general field of mechanical engineering seem to point out possibilities of improvement in the marine watertube boiler both of the small as well as of the large tube type.

It is a peculiar coincidence that the developments have occurred almost simultaneously in the two directions most vital for the efficiency of the watertube boiler, namely:

1. Water tending.
2. Firing.

To fully value the possibility of increased efficiency and regularity of the water supply to a boiler it seems best to point out the limitations of the customary arrangement.

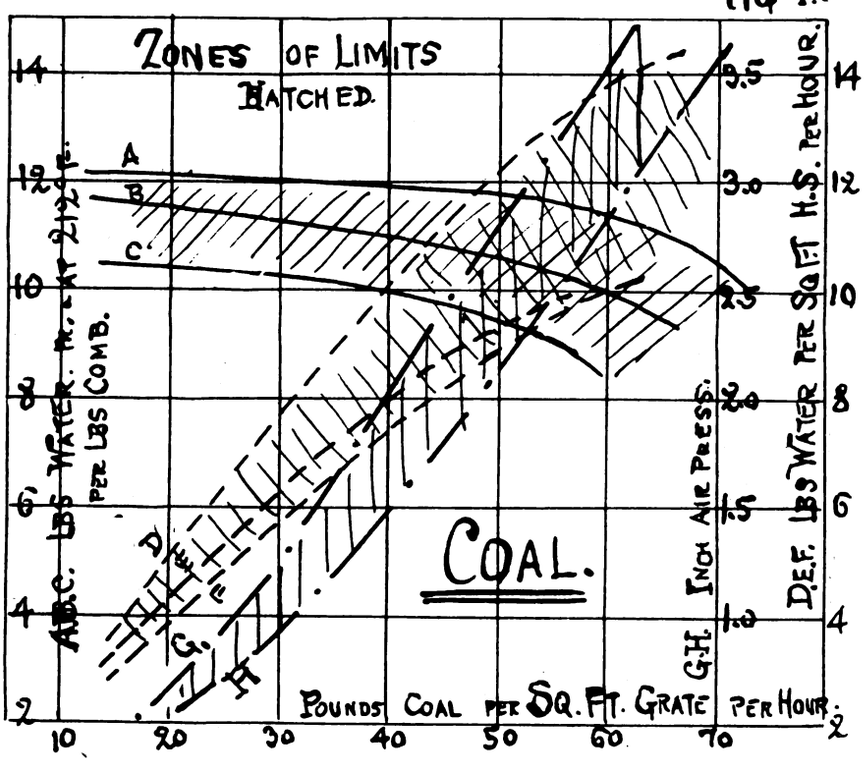
Usually the boiler feed equipment consists of an automatic check valve on the boiler and a reciprocating feed pump, which takes its steam supply from the auxiliary steam main of several boilers, or from a single boiler direct by automatic or manual control. With this arrangement the direct automatic float control of the check valve proves undesirable, as a reciprocating pump, going full tilt, would need a very large relief valve and waste considerable power if the check valve should close. On the other hand if the pump is set by manual control of its steam supply for a slow operation, it might even with a fully open check valve not have capacity enough to replace the evaporated water.

With automatic steam valve control a great difficulty arises as soon as more than one boiler has to be fed and it proves almost unavoidably necessary to provide a separate automatic feed pump for each boiler, which in larger plants leads of course to very undesirable complications and a great deal of attention and care of the engineering staff.

For the ordinary merchant service of multiple boiler installations it is usually found the best all-around compromise to have one main feed pump tend all boilers, manually regulate its steam supply and manually throttle at each individual check valve the water supply to each boiler.

This periodical adjustment and readjustment need not be performed very often with Scotch boilers, due to their very large storage capacity and evaporation surface, but proves an endless source of anxiety and care to a limited engineer force with the small capacity and the small water surface of most watertube boilers.

FIG 1.



Question of Boiler Feeding

In the final analysis of successful boiler feeding by reciprocating pumps it is seen that the steam supply at the pumps as well as the water supply at the boilers should be regulated simultaneously, independently but correspondingly, before any automatic arrangement can be found truly reliable and efficient.

It seems rather the type of pump that make present automatic feed arrangements complicated, cumbersome and unreliable and thereby seemingly greatly retarded the introduction of watertube boilers. More so as an additional complication arises from the fact that they were usually built in smaller units and larger numbers than Scotch boilers for a plant of a given size.

Here modern developments enable the search for improvements to point to a new type of boiler feed pump, the multi-stage, high-pressure centrifugal pump, an old friend to the marine engineer for condenser cooling water circulation and even for the new task of high-pressure boiler feeding, retaining its principal advantages of simplicity, absence of valves, purely rotary motion and ease of caretaking.

The fundamental characteristics of the centrifugal pump are that its pressure producing capacity is obtained by a conversion from velocity into pressure and that this conversion may remain practically constant throughout a wide range of discharge of feed water against this pressure solely by keeping the velocity or revolutions of the pump runner constant. A set of three to six impellers revolving at a fixed speed might appropriately be compared with a hydraulic accumulator at its top lift, always loaded and ready to automatically discharge its feed water when the call comes. It needs no relief valve, and its limited velocity will allow it under no circumstances to exceed a certain predetermined maximum pressure. It is also relatively economical in its pow-

er consumption, as with no discharge it uses power only to produce the required head and to overcome its own friction and increases this power demand only correspondingly to the increased discharge of feed water.

This steady-pressure accumulator-like action can very conveniently be employed for the automatic feeding of a number of individual boilers by giving each one a simple double-seated feed throttle valve actuated entirely internally by a float arrangement without any stuffing boxes or parts subject to heavy friction or wear. Even sediment or scale upon the valve and its seat need not have a great effect upon its efficiency, provided they do not get completely stuck, as the difference of pressure between that in the feed pipe and that in the boiler is only relatively small and the resulting leakage would be small also.

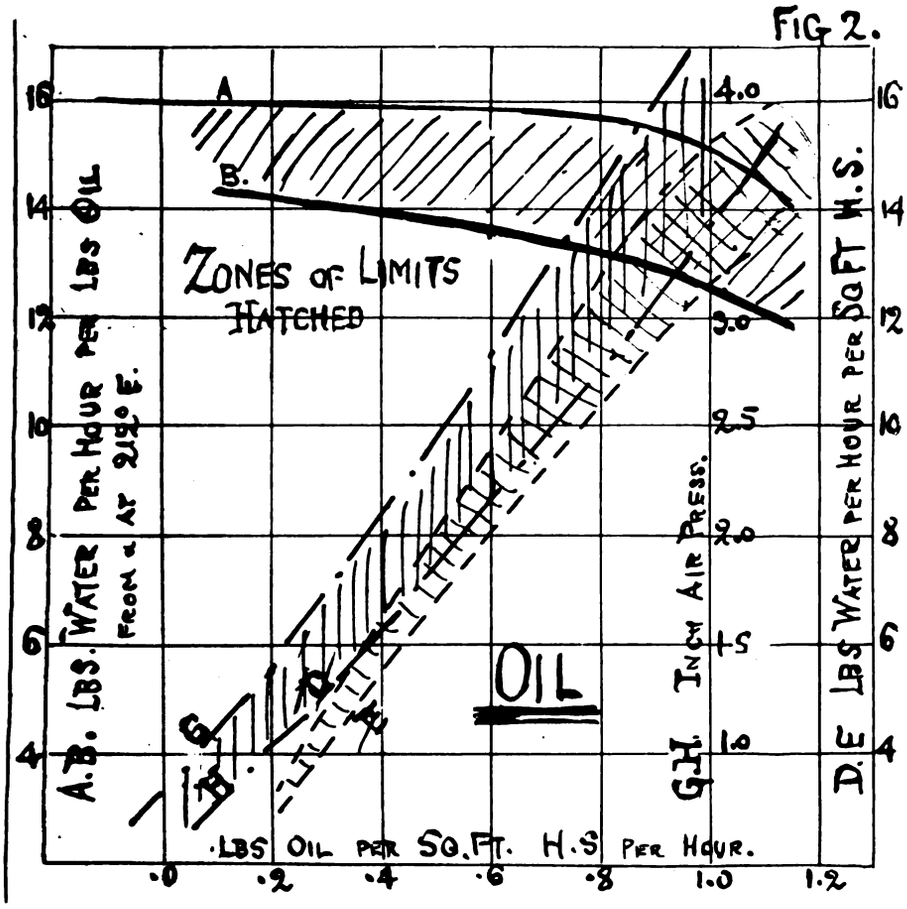
An advantage is that this is the entire automatic arrangement, because the increased or decreased steam supply to the pump engine or turbine is being taken care of automatically by the regular steam engine governor, which acts promptly and correspondingly to any demand of the centrifugal pump for more or less power from its engine for maintaining uniform speed under the increased or decreased feed water discharge.

With the great accuracy of modern steam engine governors and their sensitiveness toward an almost immediate respond it seems as if the multi-stage high pressure pump could safely be entrusted with the automatic water tending of a number of watertube boilers under even fluctuating and irregular demands for steam from them. Likely no more attention from the engineer force would be required for their efficient operation than is at present required by the customary arrangement of Scotch boilers.

The driving engine for such a centrifugal boiler feed pump may be any kind of turbine or reciprocating steam or internal combustion engine which admits of close regulation and governing. Due consideration should be given to the fact that such a centrifugal feed pump must run continuously as long as any boiler is under steam for the largest part of the time under reduced powers, fluctuating perhaps mostly between 50 and 75 per cent of its capacity. For this reason it would seem desirable to choose an engine that holds its economy well at reduced powers, while quickly acting upon the fluctuations of its governor. The common single-cylinder high-speed steam engine with flywheel governor of the Rite's inertia or similar type would fill the requirements for such a case very well, particularly if its exhaust could be used for feed water or other heating.

The internal combustion oil engine of the semi-Diesel type comes also to the fore recently for independent marine auxiliaries even in connection with main steam engines and boilers. Without the complication of air compressors it is in two-cycle arrangement an exceedingly simple machine, which can use kerosene and perhaps in many cases distillate at a moderate cost for fuel, which is always ready to start at a moment's notice, whether steam is up or not, and which can vary in power output over a wide range with very little variation in fuel economy.

FIG 2.



Mechanical and Commercial Efficiency

The second point of recent developments favorable to higher mechanical and commercial efficiency of marine steam boilers is in the direction of firing them. This means fuel supply in the right, properly graduated amounts at regular intervals and in such distribution in furnace and over the absorbing heating surface, that there is obtained the largest possible amount of heat from the fuel and the largest possible amount of steam from the boiler.

The twofold problem of furnace generation and heating surface absorption of the heat proves for the customary fuel of coal a knotty one, particularly as far as furnace generation is concerned if it is attempted to obtain higher mechanical as well as commercial efficiency than at present obtained.

Recent developments, largely of commercial character, point out the road toward far-reaching improvements by changing from coal to fuel oil.

To fully realize how far this fuel substitution may affect the whole marine boiler situation it seems best to point also in this second consideration of firing the limitations of the old fuel of coal, which apparently prevent much improvement in its utilization regardless of numerous experiments that only proved the stubbornness of the problem.

Particularly on board ship increased machinery weight means decreased carrying capacity and last but not least increased first cost and frequently increased labor charges. For example, if the old way needs three boilers and the new way only two, the attendence charges likely would be only two-thirds, assuming that the same ease and efficiency of operation

is obtained.

In coal-fired boilers principally of the Scotch type, manual firing has proved up to this date commercially the most efficient mode of fuel supply. While automatic stokers have been tried under large tube watertube boilers apparently they were not a full success on board ship. This was probably due to the fact that with anything like accelerated combustion up to 20 or 22 lbs. of coal per square foot of grate they did not distribute the fuel uniformly enough to prevent holes burning into the bed of coal and admitting cold air into the furnace. Clinkering also seems to have frequently been a source of annoyance and interruption of regular, uniform service.

Manual Labor in Stokehold

With coal consumption of 20 to 25 lbs. per square foot of grate these manual firing conditions work fairly well with average fire room labor, but as soon as these rates are exceeded troubles in the furnace increase as well as multiply. The thickness of the bed of fuel has to be increased beyond 5 to 8 in. with greatly increased difficulty of preventing clinkering, cleaning the grate and keeping the combustion fairly uniform throughout the fuel bed. Alone the purely manual labor of shoveling the fuel into the furnace proves already fatiguing for the average man, who has still less time for the proper trimming and spreading of the coal in the furnace. In Scotch boilers particularly, with their corrugated furnaces the fuel bed gets so close to the roof of the furnace that the volume of the furnace is relatively too small to secure the proper rapid intermixing of air and gases for complete combustion. The velocity of the gases is so high that the time is lacking for complete combination of the oxygen of the air with the volatile hydrocarbons of gaseous or semiliquid tarry nature before the tube heating surface is reached. Frequently they get chilled in such cases and do not ignite at all or only in the breeching after passing the tube surface.

With any type of forced draft, and this is an imperative necessity for rates of combustion above 25 lbs. of coal per square foot of grate, frequent opening of the firedoors admits large quantities of cold or only moderately heated air into the boiler, very much to the detriment of tightness of seams and tube ends and to the detriment of the steel material in general. Numerous Scotch boilers of the navies of the world have completely been ruined, sometimes in a relatively short time, or at least been put in need of extensive repairs by the application of excessive forced draft.

Watertube boilers are not nearly as cramped as Scotch boilers in furnace height and it is for this reason partly and partly on account of their greater elasticity of expansion that they are much better suited for increased forced draft. However, the other difficulties of firing coal in large quantities, as clinkering, inefficient spreading and mixing or cleaning of the fuel bed remain at the same state of variability, due to the capacity of the individual fireman.

It is most fortunate that with oil fuel almost all these difficulties disappear. But the question assumes a new aspect, but demanding less brawn, but more brain for the intelligent management of firing boilers by fuel oil. It requires a man of sound judgment to realize that fine adjustment of burners, pumps and fans, which will prevent waste and secure the fullest possible economy.

The principal distinction of fuel oil from coal is the fact that it is handled entirely mechanically instead of manually. The oil is transferred by pumps in any desired quantity at any desired speed from the dock into the oil tanks, from the oil tanks to the strainer and heater and through the burners into the furnace with a great saving of time and labor.

Table I, published in 1909, gives a good comparison between the labor necessary for both fuels on the same ships.

Another vital advantage of oil fuel is that all adjustments to the burners and to the air supply can be made from the outside and that it is only seldom necessary to open the firedoors. This, excluding the detrimental rush of cold air, allows a much higher pressure of forced draft to be employed than would be advisable with coal.

Pressures of 4 to 5 in. of air pressure have been employed on naval vessels without any drawback to the boilers.

The absence of a thick fuel bed and the possible removal of the entire grate gives more furnace volume for better combustion. For merchant vessels and Scotch boilers it would probably not be advisable to increase the draft beyond 2 in. of air pressure and about ½ lb. of oil per hour per square foot of heating surface, as with still higher pressure the gases might not find time for thorough mixing. The oil fuel would enable Scotch boilers also to produce more power from less weight and less first cost. Another point of economic importance that hinges upon the substitution of fuel oil for coal is the fact that with it boilers may be made of much greater length than was found advisable with coal. Hitherto grates were kept of a length seldom exceeding 6 to 7 ft., limiting by its area also the desirable area of heating surface. In actual construction Scotch single ended boilers therefore seldom exceed from 12 to 13 ft. total length. With oil fuel there need be no limitation of length of furnace, in fact more length may mean better mixing of gases and better combustion. The amount of oil that can be blown into the furnace is limited only by the time element necessary for good combustion and economy and the heat absorbing surface and capacity. Scotch boilers with oil fuel might well be made with tubes 14 to 16 ft. long, and with overall lengths of 18 to 20 ft. The boiler would be relatively lighter and cheaper with less fireroom front and space and fewer stop valves, feed checks, etc., to attend or to watch.

This same reasoning applies to watertube boilers and with them the air pressure can be doubtlessly higher as the furnace can be made of almost any size or length and by sufficient baffling in the gas passes the heat can be very efficiently and completely abstracted by the tube surface. Three and even 4 in. of air pressure with consumption of 0.8 to 1.2 lbs. of oil per hour per square foot of heating surface might prove commercially practicable in first class well designed watertube boilers, where brick work and casing can continuously endure this amount of air pressure.

Compiled from published tests

Table I.

LABOR COST PER DAY

No.	Fuel.	Boiler draft.	Tons of fuel used.	No. of firemen.	Wages stoke-hole complement.	Victualling, etc., firemen.	Repairs and maintenance.	Total cost.	Total cost per ton of fuel.
					£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1	Coal	Natural	22½	11	1 9 4	0 11 0	0 5 5	2 5 9	0 2 0
	Oil	Natural	15	3	0 8 0	0 3 0	0 0 9	0 11 9	0 0 9½
2	Coal	Forced	29¼	14	1 17 4	0 14 0	0 10 1	3 1 5	0 2 1
	Oil	Forced	19½	3	0 8 0	0 3 0	0 1 0	0 12 0	0 0 7½
3	Coal	Forced	330	..	19 12 0	12 13 0	5 5 0	37 10 0	0 2 6
	Oil	Forced	200	12	2 0 0	0 18 0	0 7 6	5 5 6	0 0 4

largely under the auspices of the United States navy Fig. 1 and Fig. 2 give what might be called limit zones within which the performance of boilers in efficient condition should fall. It contains the vital data on forced draft and fuel consumption per square foot of heating surface as an expression of the commercial and financial value of relating output to weight and first cost and data on fuel consumption per pound of evaporated water as an expression of its mechanical value by relating economy to output.

Before long shipowners and builders are likely to pay more attention to the possibility of getting the smallest, lightest and cheapest boiler that will easily and lastingly furnish the required steam. Due consideration should, of cource, be paid to the questions of repairs, total life, depreciation and interest of boilers, increased earning capacity of the ship by larger carrying capacity or quicker and more trips, etc.

It is well worth the time to compare unbiasedly the different factors that might influence the choice of a boiler system or type toward that averaging compromise between commercial and mechanical considerations.

Table II attempts to compile conservatively some of the different factors that might enter the comparison between a three-furnace Scotch boiler and a medium heavy watertube boiler. The Scotch boiler is practically like some built on the great lakes for the Pere Marquette. The watertube boiler is a design of a boiler building corporation, embodying steam drums of 5 ft. diameter and heavy tubes of 2¼ in. diameter. These sizes are unusually heavy and specially designed for merchant service and in connection with the extra weight allowance of Table II, for heavy firebrick, closer supports, heavier casings and lining might prove amply able to withstand continuous severe sea service of merchant ships, if used with thoroughly efficient automatic water level regulators and oil fuel.

TABLE II.

	3 furnace Scotch boiler.	Medium h'vy water tube boiler.
Width, ft.	13 9	13 9
Height, ft.	13 9	14 3
Length, ft.	12 0	10 6
Heating surface, sq. ft.	2,100	2,850
Air pressure, in.	1.2	2.25
Oil per sq. ft. H. S., lbs.	0.34	0.66
Evaporation per sq. ft. H. S., lbs.	5.0	9.0
Evaporation per lb. oil, lbs.	14.7	13.6
Total evapor'n per hr., lbs.	10 500	25.650
I. H. P. at 15 lbs. water per hour, lbs.	700	1,710
Sq. ft. H. S., per I. H. P.	3.0	1.65
Weight with fittings, lbs.	87,900	45,600
Weight of water, lbs.	50,275	22,200
Weight added for extra brick, etc.	.....	10,000
Total weight, lbs	138,175	77,800
Total weight, tons	51.2	34.73
I. H. P. per ton	13.8	50.0
Weight per sq. ft. H. S., lbs.	65.75	27.3
Approx. first cost per sq. ft., H. S.	$4.28	$3.04
Approx. first cost, total	9,000.00	8 640.00
Approx. first cost per I. H. P.	12.86	5.05

Thoroughly reliable installations of oil fuel may at present be obtained commercially at reasonable prices for either steam or mechanical atomization. Former difficulties are now easily overcome by the present provisions of straining, of settling entrapped water, of warming the oil and of regulating and equalizing the oil pressure as well as the amount of air and steam.

Steam machinery of the most modern type has still considerable vitality in its economic aspect of competition with internal combustion propelling machinery which at the present time can in large units produce a brake horsepower on about 0.45 lbs. of crude oil or distillate.

If modern steam boilers of light weight, high output and relatively low first cost can be made to evaporate from 14 to 16 lbs. of water per pound of oil and if modern relatively simple and inexpensive engines can be made to run out and be kept running at 9 lbs. of water or less per brake horsepower then they can furnish a brake horsepower on 0.64 to 0.57 lb. of oil.

At such rates and where the heating problem enters the calculation many installations of steam machinery might show the most profitable balance sheets.

To realize such unusually economical results careful analysis and wise selection solely upon the merits of the case are required. The possibility seems in reach for progress toward a higher goal.

Eckliff Boiler Circulator

One of the interesting auxiliary exhibits at the annual meeting of the Lake Carriers' Association in Detroit, Jan. 16, was a miniature Scotch boiler equipped with the Eckliff automatic boiler circulator. This circulator is of special steel tubing, placed and shackled within the boiler in the furnace. It can be installed in new or old boilers without any mutilation of the structure whatever. The Eckliff circulator causes rapid and constant circulation of water in the boiler, eliminating pelting, furrowing or cracking of furnace and produces a temperature in the bottom of the boiler almost equal to that of the steam chamber. Some excellent testimonials of its efficiency have been contributed by the engineers of the Detroit, Belle Isle & Windsor Ferry Co.'s vessels.

Items of Interest

The Union Gas Engine Co., 503-505 Mission street, San Francisco, Cal., have in recent years equipped quite a number of large commercial vessels with their four-cycle heavy-duty gas engines, installing the largest marine gas engine yet in actual service. Among the installations is a 500 H. P. gas engine in the oil barge Contra Costa, and engines of 250 H. P. in the oil barges Venecia and Petroleum II. Installations of this engine have also been made in car ferries.

W. P. Richardson & Co., of Jacksonville, Fla., will build the new terminals for the Clyde line at Charleston, S. C. Two piers will be built, one 500 ft. long by 125 ft. wide, and the other 500 ft. long by 275 ft. width. The structure will be of creosoted lumber and the superstructure will be of steel frame covered with corrugated galvanized iron on the sides.

J. L. Boyd, commercial agent for the Kansas City Southern Railway Co., announces that additional dock facilities will be provided at Port Arthur for the Southern Steamship Co., which began a new service between Philadelphia and Port Arthur during the present month.

Charles M. Schwab, who has closed a deal for Chilean ore lands, announces that he will build a fleet of American steamers to carry the ore from Coquimbo through the Panama canal to the furnaces of the Bethlehem Steel Corporation.

Owing to inability to get new tonnage within a reasonable time, the United Fruit Co. has purchased four steamers from the Royal Dutch Co., of 4,000 tons each. The company is building six new steamers at Belfast.

The Eagle Packet Co., St. Louis, has just given contract to the Howard's Ship Yard Co., of Jeffersonville, Ind., for a sternwheel steamer for service on the Mississippi river, to be 240 ft. long and 38 ft. wide.

The Norway-American-Mexican Steamship Line, operating a service between Newport News and Norway, contemplates the establishment of a line between Philadelphia and Norway.

The stockholders of the Atlantic Fruit & Steamship Co. have approved the plan of reorganization and hereafter the company will be known as the Atlantic Fruit Co.

SETTING SAIL ON THE AMERICAN BARKENTINE JAMES TRIFT

THE shipping lists lately showed that there are just two American square-riggers in the port of New York—a far cry this from the days when jibbooms bristled along South street like quills upon the fretful porcupine! Jibbooms of sturdy American ships they were for the most part, too, ships fresh from the uttermost ends of the earth. What could say plainer that the windjammers are on their last legs?

Now, as an admitted crank on the subject of square-riggers, I look upon all these dwindling deep water fellows as friends; sympathize with them in their steadily losing fight against steam, grieve when I read that one of them has succumbed to the allurements of the barge owner to enter upon the degraded life of a hulk with its greater profits, and chuckle when another evades the clutches of these white slavers of the sea. For few such friends remain.

Their Losing Fight

As eagerly as though my last dollar were tied up in her, I have for some time past followed in the ship-news columns of the papers the meanderings of the Aryan of Bath. The Aryan is a good deal of a celebrity in the American merchant marine. Launched in 1893, at Phippsburg, Me., she was the last wooden full-rigged ship built in this country, and is today the only vessel of the type owned on the Atlantic coast. Last spring when the Aryan was out 154 days on a passage from Baltimore to Seattle it looked for a time as though even this lone representative of the rig had gone, but she turned up safely.

In 1908 there were 24 like the Aryan owned on this coast; in 1902 there were 80. The barge lines can tell you what has become of most of them; they want such fine craft badly, and their discouraged owners are good listeners.

DAVID A. WASSON.

David A. Wasson, the author of the article on the vanishing Wind Jammers, was appointed at the age of eighteen marine observer at Portsmouth, N. H., and has been credited with knowing by sight every sea-going vessel between Maine and Florida. He has taken great interest in the development of Portsmouth, which is an important coal port, and a well known harbor of refuge, as well as the home of a great navy yard. He comes from a sea-faring family, his grandfather and father being shipowners and sailors. He has written considerably for magazines.

The splendid clipper ship A. G. Ropes, dismasted some five years ago in the Far East, was brought all the way to New York under jury rig when the barge people got wind of her predicament, and there are many other beautiful Bath-built ships, sold years ago in the Pacific, which have been sold back again making the 13,000-mile voyage from the west coast with the same dismal fate in prospect before they passed out the Golden Gate. Scores of the barges now plodding up and down the coast were ships and barks practically as good as new when despoiled.

The Aryan of Bath

The Aryan on her last trip east received columns of recognition in New York and Boston papers. When asked by reporters if she would become a barge, her owners replied that she would keep her yards aloft for a time at least. Whether she will run the gauntlet on her forthcoming visit remains to be seen.

This magnificent ship in her lone eminence is typical of the whole American fleet of square-riggers. The fleet is full of "last survivors." There is just one brig left on the coast, and she is the Motley of New York. She is in the Gulf and West Indian trade, and a reef or a Caribbean hurricane will get her one of these days. I might mention the fisherman-hulled whaling brig Viola of Portland, built

in 1910, at Essex, Mass., but that I am talking only of merchantmen. However the Viola is the only merchant brig built in this country since the Telos, launched down in Maine in 1883, and long lost.

Maine still clings to her last barkentine, the Mabel I. Meyers, which the little town of Searsport, peopled with retired shipmasters, cherishes as its sole reminder of former deep water prestige. The Meyers, which is also the last of her rig built on the Atlantic coast, usually carries lumber to South America, but a few years ago covered herself with glory by taking a cargo of fruit box shooks from Stockton Springs to Castellamare and bringing back Trapani salt to Bucksport. Old Glory hadn't been seen—let's whisper it—on the Mediterranean on a merchantman since—well, my grandfather once made a passage to Smyrna on the ship William H. Storer, later the barge Hamilton Fish, and her arrival there was a good deal of an event then. He has been dead 25 years, and his trip to the levant was years before he died.

Only a Handful of Barkentines

There are only a handful of barkentines left anyway, and they rarely get far from their native heath. Most of them are in the lumber trade between the Gulf and New York or West Indies, and will probably end their days as fore-and-afters, as many of their sisters have done. They are too small for profitable barges as a rule. Not long ago the Allanwilde and John S. Emery of Boston, brought Barbados molasses to Montreal, and it was a seven days' wonder in the St. Lawrence when they flew Old Glory side by side at the docks. The others owned on the coast are but the Antioch, Bruce Hawkins, Daisy Read, Ethel V. Boynton, J. B. Rabel, Kremlin, Mannie Swan and Mary Barry, and of these the Kremlin is for a time *hors de combat*, for she was nearly ruined by fire at Portland last summer. When a square-rigger is driven from off-shore trade on to the coast it is usually a foregone conclusion that the "white slavers" will get her soon. But as long ago as 1899, I saw the bark Tillie Baker of New York, at the Portsmouth navy yard, N. H., where she had brought hard pine lumber from Pascagoula. *Mirabile dictu*, she has been on the coast ever since, and they haven't got her.

BARKENTINE BENECIA

The bark Matanzas of Philadelphia, is another stubborn hooker. Four winters ago I was at Norfolk when she was towed into Hampton Roads by a revenue cutter, full of water and in such shape that I thought she would never make another trip except as a barge. But she lived to get ashore and full of water again at Bermuda last winter, and defied the worst of the lacerating coral reefs at that. Now she's carrying coal and lumber on the coast, still square-rigged.

GERMAN SHIP NANARCHOS IN STAYS

A Picturesque Packet

The little bark Silicon of Philadelphia, built for the kryolite trade from Ivigtut, Greenland, to her home port, eked out a precarious existence on the coast for 10 years after she was superseded by foreigners, but has recently thrown up the sponge. The Silicon was a picturesque packet. Perhaps it was in that far northern clime that she got the trick of sporting a quaint windmill pump amidships like the old-time Italian and Norwegian windjammers we still see sparingly on our coast. She seemed to need it badly when the steamer I was on passed her running into Hampton Roads before a March easterly three years ago. The old windmill was working hard, and a good stream of clear water spouted through her scuppers. I afterwards read that she had sprung a leak outward bound with coal, and put back.

The tenacity with which these little ships have kept in the game even so long is a wonder, for the recent experience of the iron Boston bark Nuuanu, a typical one, was enough to sour a dozen owners and make as many converts to steam. She sailed from New York for Honolulu in August, 1911, was damaged in a gale off the Horn and put into the Falkland Islands for repairs. The repairs took almost a year; ship yards don't grow promiscuously in "sixty south". She has just been sold to Honolulu parties, and it was but a natural sequence of this hard luck that her sister bark, the Foohng Suey, should be sold for conversion to an oil barge upon her arrival on this side a little later. The other barks on this coast are in West Indian and South American trade except the Charles G. Rice, which now brings aliens of various degrees of desirability to this country from the Western Islands. Besides, there are left of a fleet which 50 years ago was almost unnumbered, only the Carrie Wins-

low, E. C. Mowatt, Normandy, Onaway and Penobscot.

Going out of New York we once overtook the four masted steel ship Dirigo of Bath, just off on a round-the-Horn jaunt to San Francisco. I say we overtook her; for hours it was doubtful whether our steamer was in our class at all. It was blowing freshly from the nor'west, and if the Dirigo had any more moon-rakers and star-gazers to spread on those beautiful tall spars I didn't see where she could put them.

Every one of the great white balloons from the course up was pulling about a hundred horsepower per square inch, and her sleek white hull pushed a still whiter breaker ahead of her that the Arkansas couldn't have beaten on her trial trip. If the ship-entine Dirigo didn't look like a White Hope for the American sail merchant marine then I wouldn't say so.

Yet discouragement seems to be written in the very being of these vanishing beauties. Last spring the Dirigo was 143 days making the passage from San Francisco to New York. A sister ship, the Acme, reached Sandy Hook in 128 days from Tacoma, and even the redoubtable Erskine M. Phelps, another four-sticker which has made some of the best of latter day passages, at about the same time was 112 days in getting from Honolulu to Philadelphia. And none of these were regarded as long trips.

Some Record Passages

How poorly these compare with some made by the early clippers! The Comet once made the passage from 'Frisco to New York in 83 days. The ship Flying Cloud was only one day more in making the return voyage between the two ports. The ship Sovereign of the Seas came from Honolulu to New York in 82 days, and on the previous trip went from Sandy Hook to the Golden Gate in 102 days, two weeks of which time were spent in setting up a jury rig after a hurricane off Valparaiso had carried away everything on the fore and main masts above the lower mast heads.

There are only four like the Dirigo on the Atlantic coast, the Acme, Edward Sewall, Erskine M. Phelps and William P. Frye. They are all that remain of the much-decimated sail fleets of the Standard Oil Co., and of Arthur Sewall & Co., of Bath, and they have taken a last stand in the coast-to-coast trade. A momentary flicker of hope that their kind might continue to defy the ravages of steam was aroused a few months ago, when it was announced that the Sewalls proposed to fit their four ships with the internal combustion engines which have worked so well in some of the big French and German ships of recent build. But it develops that if this plan materializes everything above the lower masts will be sent down, so that the ships will virtually become steamers not at all dependent upon sail.

At the present time it seems that sail lovers will henceforth depend for an occasional glimpse of their cherished yards solely upon such true yachtsmen as Arthur Curtiss James, with his magnificent Aloha.

Carrier for Submarines

The Unique Vessel Which a French Firm Has Designed for Transporting Submarine Boats

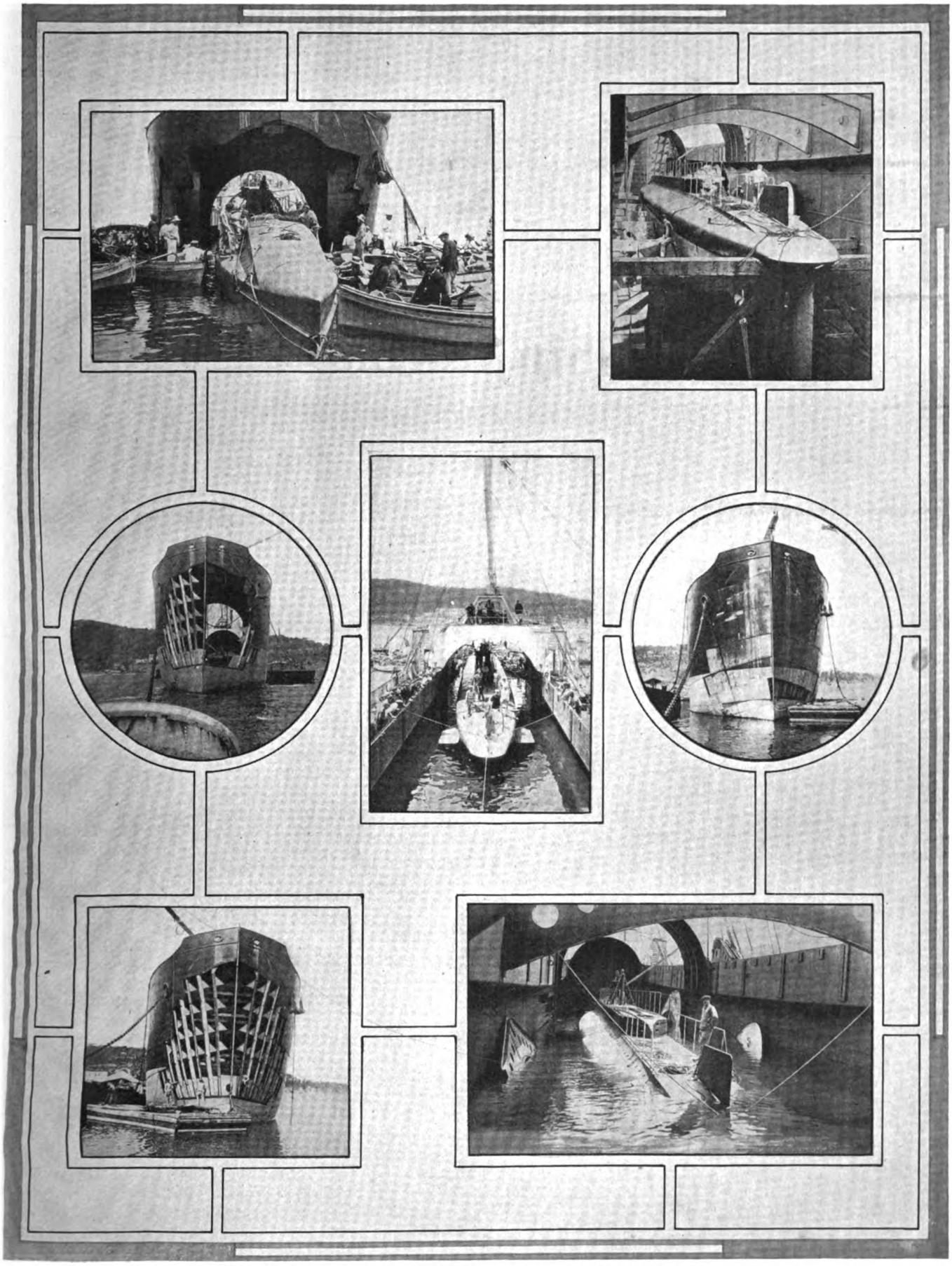
SCHNEIDER & Co., Creusot, France, have designed a new type of boat for the carriage of submarines and the first of her type, the Kangaroo, was recently completed by the Societe Anonyme des Chantiers et Ateliers de la Gironde, Bordeaux. The problem which the designers set themselves was the construction of a ship suitable for delivery to foreign navies, the submersible boat built at the Schneider yards, the shipping and unshipping of the submersible boat being carried out in any roadstead by the transport ship herself without any outside assistance, the transport being effected in condition of absolute safety from every point of view. They have solved the problem in a very clever manner as can be seen from the illustration published herewith.

The hull of the Kangaroo consists of three main parts, a central one, forming the hold, another aft and a third forward. The central portion is built in the shape of an ordinary type of floating dock and carries the submersible boat. The aft part of the ship is on similar lines to those followed in ship construction, and contains all the engines, the boilers, the coal-bunkers, the men's quarters, galleys, etc. The forward part contains a tunnel or covered canal, which forms an extension of the dock portion or hold, and is closed by a movable stem; it also acts as a levelling caisson to put the ship on an even keel. A series of sluice-valves and drain-pumps serve to vary at will the draught of the vessel when shipping or unshipping.

Very Simple Operation

The operation is a most simple one, and is carried out in three phases, as follows, for shipping a submersible boat:—The required sluice-valves are opened so as to cause the draught of the transport ship to increase by the stern, the stem rises out of the water, and the movable part of the stem (or door), closing the tunnel on the outside, is removed. This is done by unbolting the plates and the framework carrying the plates, the frames being divided for the purpose. When the stem is thus removed, a two-leaved iron inner door, which closes the hold forward, is opened out towards the stem. This door forms a bulkhead for isolating the hold when the submersible is shipped. The ship is then allowed to increase her draught forward, water enters the inner dock, and the draught is so regulated as to allow the submersible to float through the tunnel. When in the compartment amidships it is placed over the keel-line blocks and shored up.

The water is then pumped out of the forward ballast-tanks, the stem rises out of the water, and the movable part is put in place again. The next operation, after closing the inner door, consists in pumping the water out of the dock, which then forms a dry dock of the usual type; and when the ship is placed on an even keel by means of the water-tanks aft and forward, she is ready to start on her journey. The operations are carried out in the reverse order, and quite as easily, for unshipping a submersible boat on arrival at her destination.



HOW THE KANGAROO RECEIVES THE SUBMARINE BOAT, SECURES IT IN THE HOLD AND THEN BUILDS UP THE BOW AGAIN

The principal dimensions of the Kangaroo are the following:—

Length between perpendiculars	305 ft.
Extreme breadth	39 ft. 4 in.
Depth	23 ft. 10 in.
Mean draught, loaded	19 ft. 7 in.
Displacement at the said draught	5540 tons
Dead-weight carrying capacity	3830 tons
Speed	11 knots

The hold measures 193 ft. 6 in. in length, 29 ft. 6 in. in breadth, and the vertical sides have a height of 20 ft. 4 in., giving a capacity of 116,545 cu. ft.

The engine is of the triple-expansion vertical type, developing 850 H. P. The coal-bunkers have a capacity for 540 tons of coal.

The crew consists of the captain, chief officer, three engineers, two petty officers, thirteen seamen, including stokers and two boys, a total of twenty-two hands. Accommodation is provided for these and also for two officers, four petty officers, and sixteen men, forming the officers and crew of a submersible boat.

The foremast and mizzenmast are provided with sails; between these two is a cargo derrick. The boat raft carries two lifeboats, one 20-ft. gig, and one 16-ft. dinghy.

The first submersible boat to be transported in the Kangaroo was the Ferre, of the Laubeuf type, built by Messrs. Schneider, at their Chalon-sur-Saone yard, for the Peruvian government.

Besides serving for the transport of submarine boats, the main object for which she was built, the Kangaroo is to be utilized also for carrying heavy and bulky loads, such as turbines, locomotives, boilers, and so forth, which can be lowered into the hold amidships after lifting off the movable deck panels which cover it.

Motor Ship Rolandseck

She is Equipped With the Largest Engine Yet Built for a Motor-Driven Ship

THE German motor ship Rolandseck, built by J. C. Tecklenborg, of Geestemunde for the Deutsche Dampf-Schiffahrts Gesellschaft "Hansa" of Bremen, is equipped with the largest engine yet built for a motor ship. It is of the Carels type. The principal dimensions of the Rolandseck are:

Length over all, 290 ft. 2 in.
Length between perpendiculars, 273 ft. 9 in.
Breadth molded, 40 ft.
Depth molded to shelter deck, 27 ft. 6 in.
Maximum draught, 18 ft. 4½ in.
Deadweight at load draught, 2,700 tons.
Cubic capacity of cargo holds, 175,000 cu. ft.
Gross registered tonnage, 1,663.
Net registered tonnage, 756.

The general arrangement of the steamer is shown in Fig. 1. She has been built to the highest class of the Germanischer Lloyd as a shelter deck vessel, the shelter 'tween decks being 8 ft. 6 in. in height. A tonnage opening is provided aft so that the whole of the shelter 'tween decks are exempt from tonnage measurement, thereby insuring the maximum deduction for the propelling space and a remarkably small net tonnage. The machinery space and oil bunkers are placed amidships so as to avoid difficulties with regard to trim. There are four cargo holds, two forward and two aft of the machinery space, which are provided with large hatchways and ample loading and discharging appliances, as will be seen by reference to Fig. 1. Compensating strength has been secured by the use of deck girders and hold obstructions have been reduced to a minimum.

The motor engine, auxiliary boiler and oil bunkers occupy about the same space beneath the upper deck as would be required for an installation of steam engines and boilers of equal power, but a considerable gain in cubical capacity compared with a steam-driven vessel is secured in the 'tween decks due to the absence of coal bunkers. The oil bunkers are situated on each side of the auxiliary boiler and have each a capacity of 80 tons of crude oil. These bunkers extend right to the ship's side but are divided from the cargo holds by narrow cofferdams open to the boiler room, so that any leakage will not cause danger or damage to the cargo. No oil fuel is carried in the double bottom for reasons of safety and cleanliness. Each bunker is provided with a large ventilator extending about 23 ft. above the shelter deck and utilized as a derrick post. These ventilators provide a safe outlet for any gas driven off by the oil and also act as expansion spaces when the bunkers are full.

Accommodations For Passengers

Accommodation is provided for ten passengers in a steel house situated on the shelter deck just forward of amidships. The officers' and engineers' accommodations are placed in houses at the sides of the engine casing. The crew, consisting of six seamen and four greasers and firemen, are housed in a short forecastle forward.

The winches and windlass are steam-driven, being supplied with steam from the auxiliary boiler which is mainly fitted for use in port. The steering engine, which is placed in a house on the shelter deck adjoining the after end of the engine casing, is driven either by steam or compressed air. The vessel is lighted throughout by electricity and has an installation of wireless telegraphy.

The Main Propelling Machinery

The main propelling machinery consists of a six-cylinder, single-acting, two-cycle, Diesel engine of the Carels type, though to be exact it should probably be called the Tecklenborg-Carels type. The general design of the engine may be seen from the sectional views Figs. 2, 3 and 4. The cylinders and smaller working parts were supplied by Messrs. Carels Freres, of Ghent, while the crank shafts, columns and bed plates were made by Messrs. Tecklenborg. The cylinders have a diameter of 20 in. and a stroke of 36¼ in. The power developed is about 1,425 B. H. P. at 120 R. P. M. The engine is divided into three groups, each of two working cylinders. The cylinders have covers of cast steel upon each of which are mounted four scavenging valves, one fuel injection valve, one starting valve and one safety valve. The pistons are water-cooled, the cooling pumps being driven from the respective crossheads. It will be seen from Fig. 2 that the engine is of the open type similar to the ordinary marine steam engine. The columns supporting the cylinders are of cast iron, box form in section, and are six in number on each side of the engine. In order that the

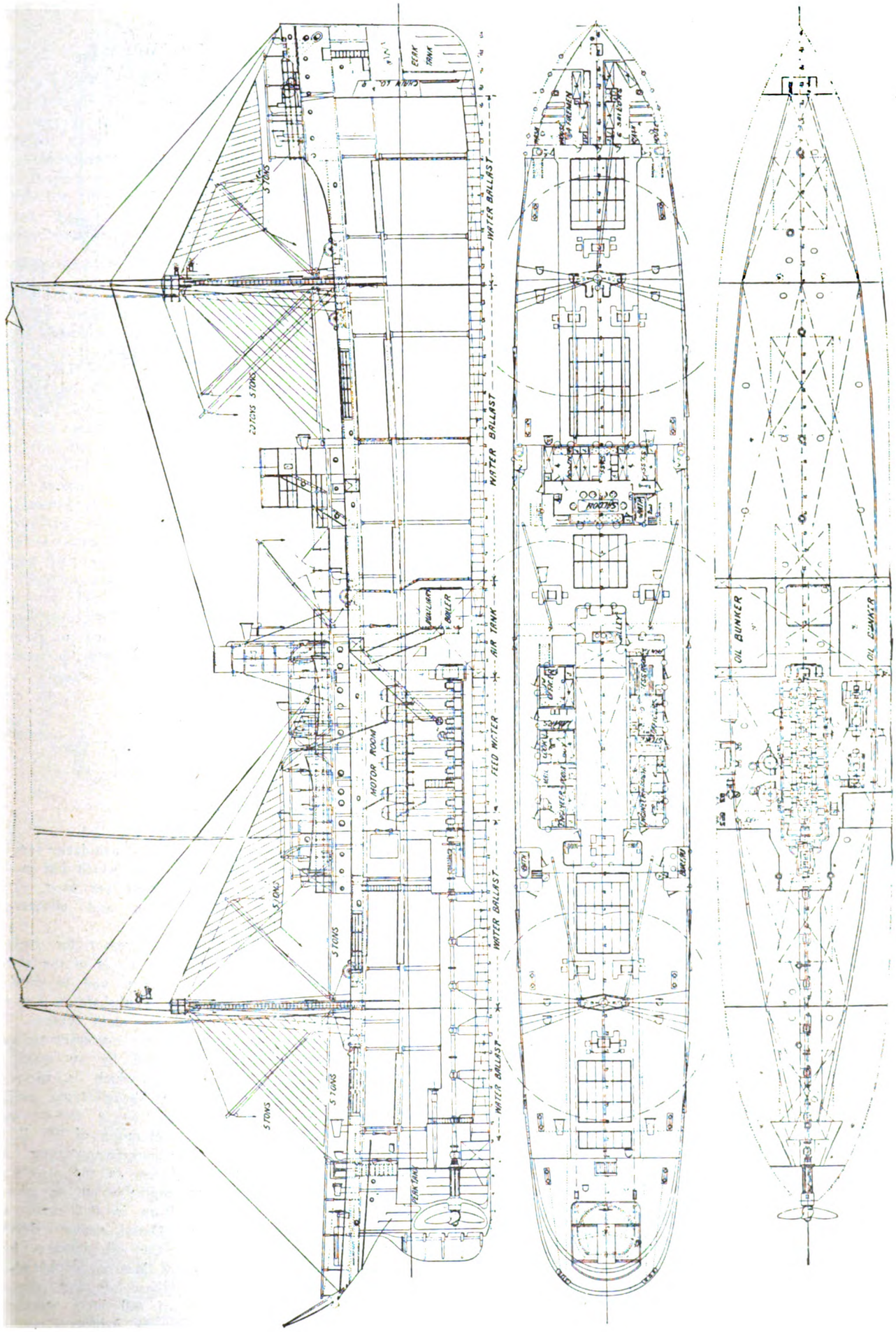


FIG. 1—GENERAL ARRANGEMENT OF THE MOTOR SHIP ROLANDSECK

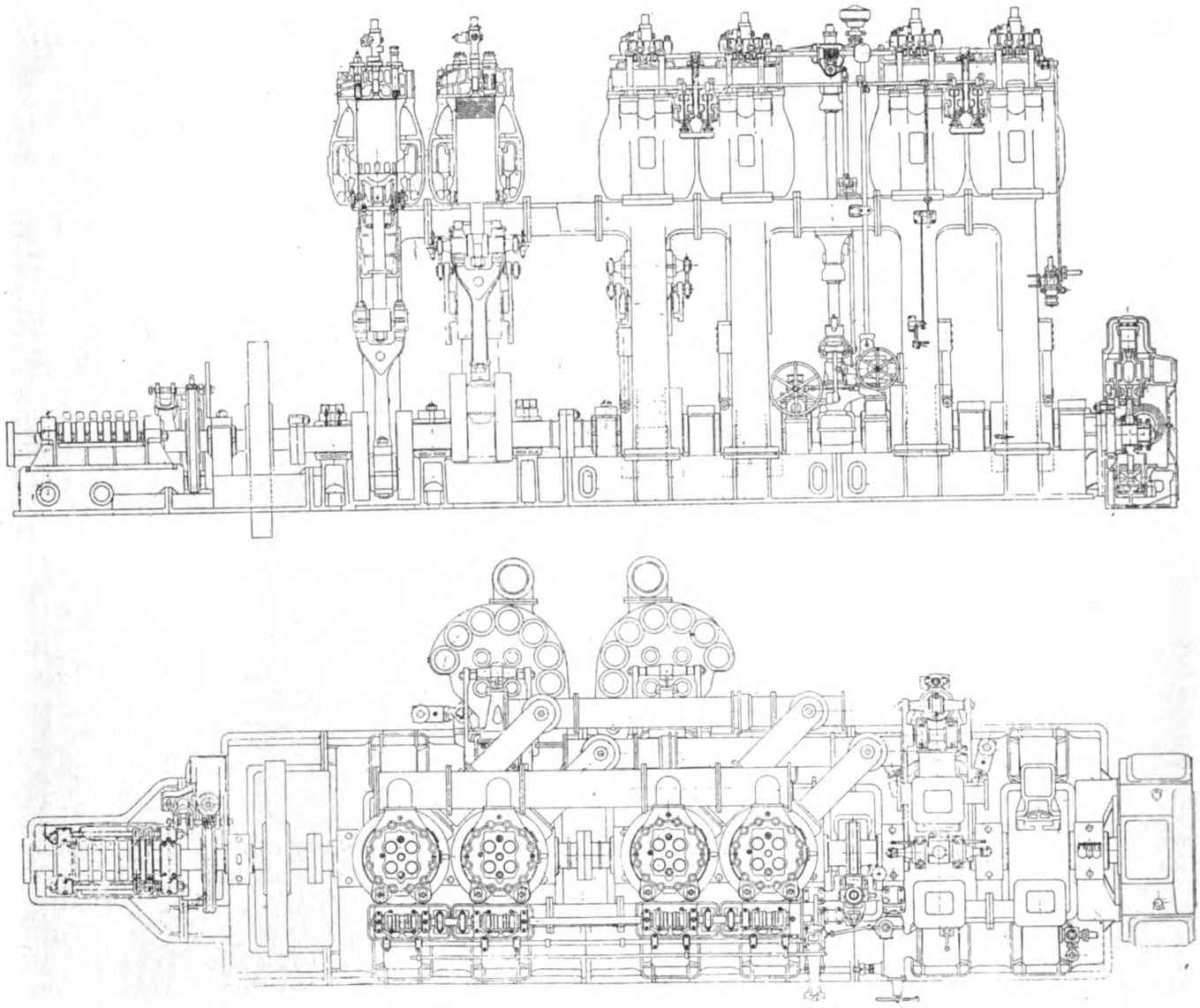


FIG. 2—ELEVATION AND PLAN OF THE ROLANDSECK'S MOTOR ENGINE

working parts may be readily accessible, single bearing surfaces are provided for the crossheads. The columns are firmly bolted together and to the bed plates, which are also of cast iron and formed in three parts of box section. The main bearings are of cast iron lined with white metal. The crank shaft is of Siemens-Martin steel and of the built type, consisting of three interchangeable sections each with two arms set 180 degrees apart.

The single propeller is four-bladed and has a diameter of 13 ft. 6 in. The thrust block is of the normal type and is provided with six thrust rings. Between the thrust block and the main engine (see Fig. 2) is placed a flywheel of cast steel made in one piece and having a diameter of 8 ft. 3 in. and a weight of about seven tons. This flywheel tends to secure an even running of the engine and to prevent undue shocks when the revolutions are suddenly altered, as for instance by the propeller racing in a seaway. Just abaft the flywheel is the engine turning gear, which may be driven either by steam or compressed air.

Scavenging Air Pumps

There are two scavenging air pumps which are driven by levers from the crossheads, as shown in the plan view of Fig. 2 and the section given in Fig. 3. These pumps have a cylinder diameter of 34¼ in. and a stroke of 30 in. and have suction and pressure valves as shown in the illustrations. The water for cooling the cylinders is supplied by two pumps, each capable of delivering 30 tons of water per hour, which are driven from the scavenging pump levers. There are two bilge pumps, each of 30 tons capacity per hour, which are driven by levers from the small air compressor used in connection with the steering engine. One of these pumps is also utilized for the wash-deck service. The ballast pump, which has a capacity of 100 tons per hour, is of the rotary type and electrically driven.

The main compressor for supplying the injection air is of the three-stage Reavell type, and is directly coupled to the crankshaft at the forward end of the main engine. The compressed air for maneuvering purposes is supplied by an auxiliary air compressor, which is also of the three-stage Reavell type, and is directly driven by a two-cylinder four-cycle Diesel motor of 100 B. H. P. The auxiliary compressor and motor are placed on the starboard side of the engine room, as shown in Fig. 1. Both in this case and that of the Diesel engine driving the dynamo, the oil motors have been made by Messrs. Tecklenborg themselves. There are five storage tanks, each of 800 liters capacity, for containing the maneuvering air,

and one air bottle of 150 liters capacity for the injection air. For the first filling of the storage tanks an emergency steam-driven air-compressor is provided. There is also a small duplex air compressor for providing compressed air for the steering engine, with pressure stages of seven atmospheres and 21 atmospheres respectively. Reservoirs are provided for the air at both these pressures and are connected by automatic regulating valves.

Starting and Reversing

The starting and reversing of the engine is accomplished by compressed air, the admission of which is controlled by the angular adjustment of the cam shaft relative to the crankshaft through the lengthwise movement of the maneuvering shaft. The valves are actuated by cams and levers from the cam shaft, there being one set of cams for ahead and one for astern motors. The starting arrangements are such that at first all cylinders work with compressed air, while subsequently the fuel is admitted to one cylinder after the other until all are developing power. For a time, therefore, some cylinders are receiving fuel while the others are working under compressed air, a state of affairs which secures greater maneuvering capabilities without further complication of the regulating mechanism. The reversing gear is operated by compressed air, but can also be worked by hand. The motor is regulated to the desired revolutions by means of a hand lever, which acts through gearing upon the suction valves of the fuel pumps in such a way that all revolutions down to the lowest rate of 40 per minute can be run as desired. A spring safety governor is provided to prevent the engine running away in the event of the propeller coming out of the water in a seaway, this governor likewise acting upon the suction valves of the fuel pumps. A separate fuel pump is provided for each cylinder, arranged near the top, as shown in Fig. 3.

Electric Equipment

The exhaust gases are led into two pipes placed at the back of the engine, each pipe taking the exhaust from three cylinders. Both pipes lead to a silencer, common to the two, from which the gases are led up the funnel, which is also utilized for the auxiliary boiler.

Electricity for lighting and power purposes is supplied by a dynamo of 164 amperes and 110 volts, which is directly coupled to a two-cylinder four-cycle Diesel engine of 30 B. H. P. when running at the designed rate of 300 revolutions per minute. The generator is placed on the starboard side of the engine room, as shown in Fig. 1.

Auxilliary Boilers

The auxiliary boiler is of the ordinary marine cylindrical multi-tubular type, and has a heating surface of 860 sq. ft. and a working pressure of about 120 lb. per sq. in. The boiler is arranged to burn liquid fuel and is fitted with Korting burners for this purpose. As already mentioned, it is mainly intended for providing steam for the winches and windlass in port, but will also supply steam for the steering gear and for steam heating when the vessel is at sea. In connection with the auxiliary boiler are provided a condenser, condenser circulating pump of 20 tons per hour, boiler feed pump of 10 tons per hour, and a steam bilge pump of 30 tons per hour capacity.

In addition to the main oil bunkers already referred to, there are two oil-settling tanks, each of three tons capacity, placed in the engine casing through which the oil passes before use, and there are also fitted two oil filters. The oil is pumped from the main tanks to the settling tanks by means of auxiliary fuel pumps worked by levers from the

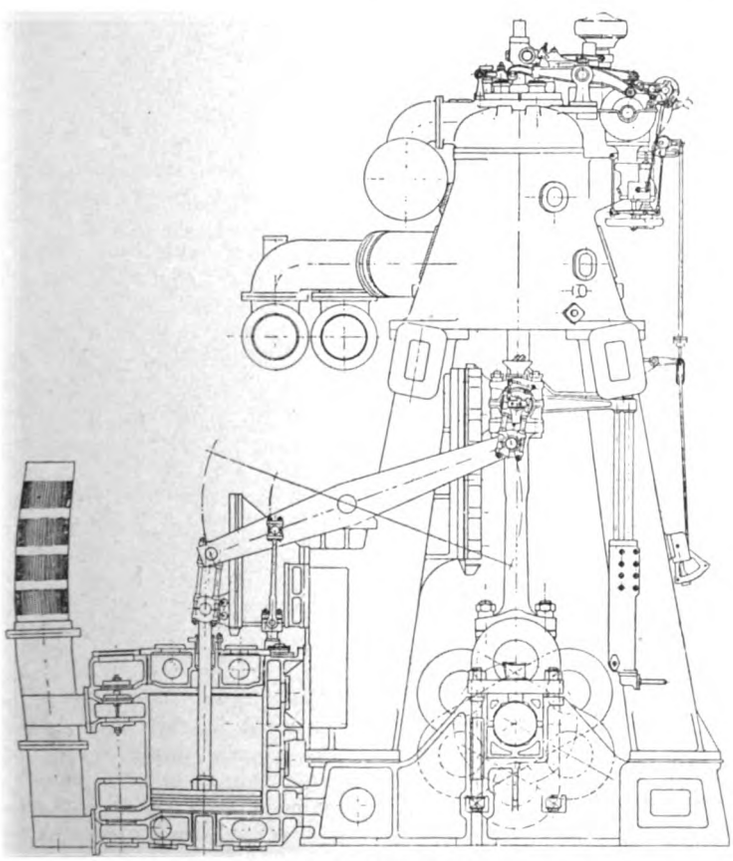


FIG. 3—SECTION OF SCAVENGING PUMPS.

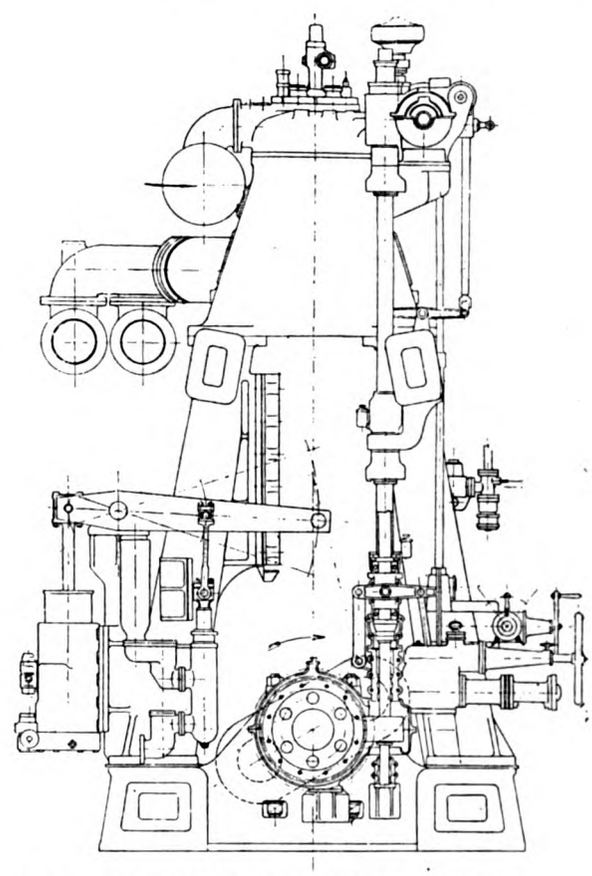


FIG. 4—SECTION AT THE CONTROL STATION

main engine, and there is also a hand pump for this purpose as a reserve. The weight of the complete engine installation, including shaft, propeller, and all auxiliaries required for the main engines, but excluding the ship's auxiliaries, is about 350 tons.

Trials of the Rolandseck

Preliminary trial trips of the Rolandseck took place on Nov. 2 and 9 and proved very satisfactory. In the second of these trials the engine developed 2,200 I. H. P. when running at 120 R. P. M., the indicated mean pressure being 106 lbs. per square inch. The fuel consumption was about 0.35 lb. per I. H. P. per hour, or about 0.47 lb. per B. H. P. per hour, taking the mechanical efficiency to be as stated by the builders, viz., 73 per cent.

The official trip of the Rolandseck took place on Nov. 16, after which the vessel was handed over to her owners. On Nov. 19 she left Hamburg for a voyage to Sunderland and back, the voyage being undertaken to thoroughly test the vessel before she entered into her regular trade between Hamburg and Lisbon. When in Sunderland a representative of the *Shipbuilder*, from which the facts of this article are extracted, visited the Rolandseck, and was informed by the chief engineer that the engine had behaved excellently. With regard to the statement, however, that a Diesel engine requires a smaller engineers' staff than a steam engine of equal power, the chief engineer stated that he did not agree with that opinion and considered the reverse to be true.

The Navy and Heavy Oil Engines

Admiral Hutchinson I. Cone, engineer-in-chief of the United States navy, in a recent lecture on heavy oil engines said: The only type of internal-combustion engine that can be considered for large naval installations is the heavy-oil engine. Gasoline and kerosene engines have no prospect of development in large units, and the stowage of their fuel is too dangerous to be considered. Bituminous producers require purifying apparatus of such size and weight that they are no longer attractive. Anthracite producers have been developed with some degree of success.

The Diesel engine had its beginning in 1893, and today is used largely in Europe, and to a less extent in America. The four-cycle type is very heavy, but is preferred for stationary purposes on account of its simplicity. On account of its lighter weight and the greater facility with which it can be reversed, the two-cycle type is preferred for marine purposes. In both types the cylinder walls and heads are water-cooled. Several European nations have for some time been using a heavy-oil engine of the four-cycle type for submarines. All of them appear to be installing a lighter engine of the two-cycle type.

Diesels Up to 2,000 H. P.

A considerable number of ocean-going vessels are being equipped with Diesel engines of various makes, up to nearly 2,000 H. P. Some of these are in service, but it is too early at this time to give exact figures as to economy and durability. We are projecting an engine of this type of about 1,800 H. P. to be used in a submarine tender. Leading European builders of Diesel engines are experimenting with engines developing upwards of 1,000 H. P. per cylinder. One of these has built a single-cylinder engine developing 1,200 B. H. P., which has been inspected by officers of our service. It has been tried, but we have not yet been put in possession of the trial data. Another similar engine with a single cylinder to develop 2,000 H. P. is building, but has not yet been tested. A third engine, to develop 6,000 H. P. in three cylinders, of the double-acting two-cycle type, has been built, and is being tested. This engine is for the German navy, and the details of construction, as well as the trial data, have not yet been made public. In all these large engines the diameter of cylinders is from 32 in. to 40 in., the stroke is about 40 in., and the revolutions per minute not greater than 150. The dimensions are thus moderate, and well suited to propeller efficiency. The heavy-oil engine has not hitherto merited consideration on account of the limited power that could be developed in a single cylinder. An installation of any size required a multiplicity of cylinders. Experience with smaller engines of the two-cycle type indicates that they will be readily reversible, and will have a satisfactory speed control. Some difficulty is anticipated in connection with the high pressures and temperatures that are to be handled. Its durability and reliability in marine installations remain to be demonstrated.

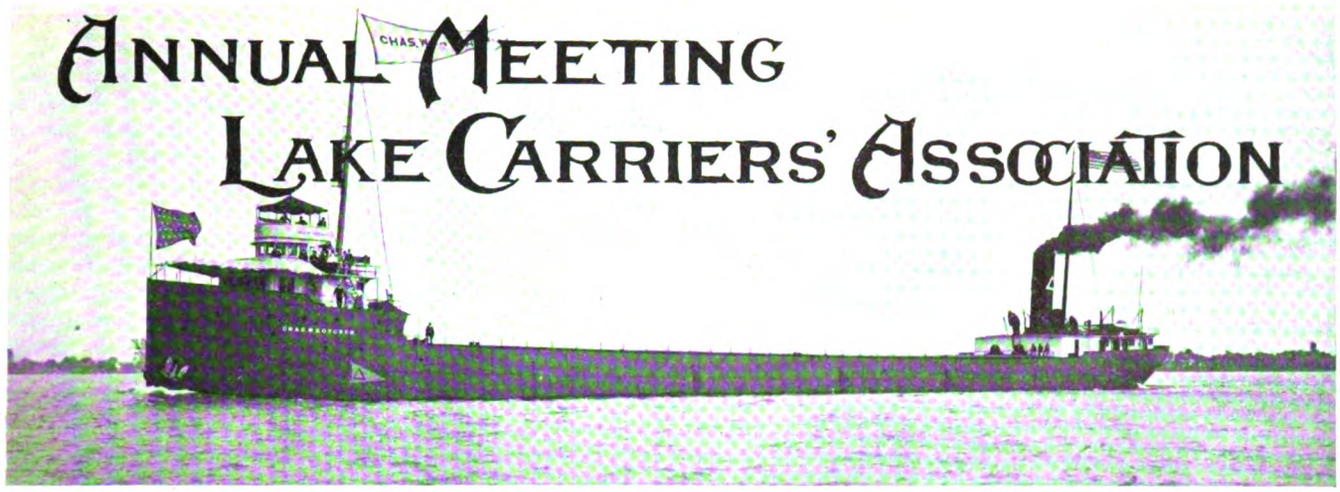
New Hamburg-American Liner

The twin-screw steamship Emil L. Boas, which is the second of the two Hamburg-American liners which Messrs. Swan, Hunter & Wigham Richardson, Ltd., Wallsend, have been building, has just completed a successful trial trip at sea. The twin vessel, the Karl Schurz, was delivered last October. The leading dimensions of the Emil L. Boas are 425 ft. long, 51 ft. broad, 33 ft. deep, the deadweight carrying capacity being 6,100 tons. The ship is to carry about 75 passengers only of the first class. The holds of the vessel are insulated for carrying fruit from the West Indies. The refrigerating machinery for the fruit holds and also for the various storerooms has been made by Messrs. J. & E. Hall of Dartford. Wireless telegraphy has been installed in the ship and also electric light. The Wallsend Slipway & Engineering Co., Ltd., constructed the main engines and boilers. The former consist of twin-screw triple expansion engines of the inverted direct acting type, and the boilers are worked under Howden's forced draft.

At the forward end of the bridge deck there is a luxurious music room. Further aft is the gymnasium and also a comfortable smoke room leading to a verandah cafe. On the shelter deck is the dining saloon, extending from side to side of the ship, and also with windows looking forward. The tables are arranged for small separate parties, and can seat 80 persons at a time. On the same deck there is a long range of handsomely appointed staterooms, most of which are grouped together with bath rooms. During the trial trip the owners were represented by their director, Mr. Eggers, Dr. Foerster, Messrs. Goos, Koehler, Landsky, Mueller and Musmann, and also by Claus Hartje and J. Drieling, the two resident inspectors, under whose supervision the ship has been constructed. After exhaustive trials the Emil L. Boas left for Hamburg under the command of Capt. Von Leitner and J. Drieling took charge of the engine room.

The White Star Line, owing to results obtained in their Arabic and Cedric, have ordered the boilers of the Oceanic, Ionic, Athenic and Canopic equipped with the Ross Schofiled system of circulation. The boilers of these four vessels contain 180 furnaces.

Annual Meeting Lake Carriers' Association



A FAMILIAR SCENE ALONG THE ST. CLAIR RIVER

PRESIDENT WM. LIVINGSTONE

WITHOUT exception, members of the Lake Carriers' Association are agreed that the annual meeting of the association which was held in Detroit on Jan. 16 was the most interesting, most spirited and the best that has ever been held. It was somewhat late in assembling, to be sure, owing to the absence through illness of that brave and tireless soul, A. R. Rumsey, chief shipping commissioner, whose duty it has annually been to see that the association convened promptly. When Rumsey assembles he assembles, and the person assembled has usually very little choice in the matter. He has been known in times past to pick them up bodily.

Broadening Its Scope

Steps were taken at the meeting to broaden the scope of the association and to increase its usefulness by the creation of committees made up of captains and engineers to deal with all problems affecting the actual operation of the ship. This action came as the result of a talk by J. H. Sheadle, who has served as chairman of the welfare plan committee for the past four years and to which attention will be given later in this article.

The annual report of President Livingstone was quite complete and forms in its way a brief history of lake trade. The year, he said, achieved for itself a most unusual position in the history of the trade, proving that presidential campaigns are no longer any barriers to the onward march of industry. Its achievements are further singular in the fact that it immediately followed the most depressed condition that the market has known in fourteen years. Mr. Livingstone stated that the experience of the year had shown, however, that ore could not be carried at 40 cents net from the head of the lakes, even by the larger class of modern carrier, and allow a fair profit to the ship on the transaction. The year, as stated, closed with a firm, vigorous and rising market and the business outlook for 1913 leaves little to be desired.

In general efficiency he stated the trade improved from year to year. While no loading records were made, the unloading record was repeatedly broken, and while the average stay in port was higher in 1912 than it was in 1911, it must be borne in mind that the tonnage handled was enormously increased and that there were many more vessels in commission. The business of the year, vast as it was, was handled without disturbance and notwithstanding the fact that every vessel in the association found continuous employment, there was at all times a liberal supply of men for all grades of employment on shipboard available.

After concluding his report, President Livingstone asked Mr. Sheadle to speak on the welfare plan, which has now been in operation aboard the vessels of the association for the past four years.

The Welfare Plan

"I wish I could say something interesting," said Mr. Sheadle, "or tell you something new about the welfare plan. Its basing principles are so well grounded, and its workings in the main so satisfactory during the four years of its operation, that everyone is so familiar with it that the subject has almost become trite.

"One feature, however, is more appealing than any other, and that is while the relations with the men on board ship have greatly improved and their condition bettered, there has been an equal improvement in the attitude of the owner and officer towards the employe—a better understanding of their inter-relations.

"This improved situation, however, is only in keeping with the trend of affairs industrially everywhere—not only in this country, but in other lands. The employer is constantly seeking to surround his people by better working conditions. He is doing this, not only from the humane standpoint, but because he is learning that improved conditions make for greater efficiency in the individual and consequently improved results in his year's operations. One concrete example of this on the ships of this association may be found in the fact that although every other industry was confronted with a shortage of men the past year, the lakes at all times had a comfortable supply. In other words, we were able to prosecute operations without abatement throughout the year, which can scarcely be said of any other industry. Had conditions not have been in the main very satisfactory this situation would not have prevailed.

Watch and Watch

Each season more and more boats are adopting the wheelsman-watchman plan, and more and more masters are adhering to the careful observance of the 'watch and watch' practice. A six-hour trick at the wheel is too long and the men are appreciating the relaxation that comes from a break in the tensity of the longer period. The large number of ships now adhering to the 'watch and watch' plan not only demonstrates its practicability, but also its desirability as a measure for the bettering of the working conditions on board ship.

"The vigilance that has been exercised by many owners in this direction should not be relaxed until this

practice is universal, and 'watch and watch' strictly maintained under the ordinary operations of the vessel on every ship in the association.

"It is a matter of congratulation that great progress has been made in this direction, as well as in other items of bettered working conditions on board ship, for it will sooner or later be found to have been only in advance of what may be made mandatory by national legislation if conditions in any industrial business should be found unsatisfactory. The newly appointed commission of the government on industrial relations will be of far reaching importance, for it is the purpose of this commission, in its varied duties, to inquire into the conditions of sanitation and safety of employes, and the provisions for protecting life, limb and health of employes.

"The best financial results in any industrial enterprise are obtained where there is the greatest efficiency in men and machinery. If it be true that a well working piece of machinery is more productive than an ill working piece of machinery, then more so is the advantage of an efficient man. To obtain then the most efficient men it is highly desirable that every effort should be put forth by those directing the employment of others, to study the best methods of doing a given work and at the same time surround the worker with the best physical conditions.

Importance of Good Will

"In working out the problem of efficiency in men one of the important factors is good will. In an address I recently heard the speaker direct attention to the item of good will as an asset to a business, meaning the good will of the buying public, and added, should it not also be remembered that the good will of the worker inside the shop is quite of as much value as the good will of the buyer without, because if the good will within is active, the efficiency will be such that the good will outside is almost a matter of course.

"The application of this may be made to conditions on our ships. It is to the better working out of these things then that the welfare plan in a primary way seeks to accomplish. It is therefore proper to remember that the suggestions that may come from time to time from the president, executive committee or welfare committee, are made for the good of the whole and not from the spirit of trying to create something in the way of additional bother to the individual owner. We are all aware of what team work does on the football ground. It is the team work now being done by the members of the association that is showing in the constantly improving lake situation. Team work is being more and more developed in the individual vessel managements by means of the now almost general practice of holding annual meetings of the officers of their ships.

Advantages of Team Work

"But this can be carried further. During the past season several of the companies have inaugurated the plan of having on each ship monthly meetings of the officers and chief employes, wherein there is a general discussion of such matters as navigation, economy in the purchase of supplies, economy of time of doing work, prevention of personal injury, etc. The result has been better economies, fewer accidents to the men, and what is best of all, a diminution of personal antagonism between heads of departments. We all recognize, I am sure, that hostilities are always costly, whether between officers or men, and great efficiency can never be obtained when workers are constantly looking for other employment.

"The president's annual report has detailed the main features of the work of your committee the past year, and there is no need for further reference. The support given the committee by the membership has been splendid, but I could wish that every member would give more of himself to the work of developing the industrial problem of the lakes, for I am sure that every effort in this direction will be repaid many fold in good to his individual business.

"Until recent years vessel management on the coarse freighters on the lakes was more or less elemental. Ships were built, a master and chief engineer were engaged, they were told to procure a crew, and the season began. There was usually profit in the business, and if the ship came in at the end of the season with a satisfactory earning, and there had been no trouble with labor, there was little attention given to conditions on the ships.

"But all this is changing, as it is changing in every industrial line. Freighting on the great lakes is no longer as profitable as in years past; it is requiring more study of details on the part of the management—greater economies are required. The care of the steel ship as regards rust, the economical use of supplies, and the prudent care of equipment, are becoming absolutely imperative if anything like satisfactory financial results are to be obtained.

"How then can this be better secured than by the proper selection, training, and encouragement of the men operating the ships? The man who is taught and encouraged to save his own money, to economize in his use of ship supplies, to always coil up a rope and put it in its place, to keep a watchful eye out for rust, indeed taught the thousand and one things that make for the economy of things, makes for the greater success of the ship's owner.

"All this then comes back to the element of personal equation—the final quality of the men.

"If all this, then, be true, what greater factor is there in the whole proposition than the creation on board our ships of harmonious feeling, and good working conditions surrounding the men? Great strides have been made in this direction and more may be accomplished.

"I want to give you just a few figures regarding the saving of money. I talked on that feature last year and I hesitate to say very much more about it. I do not seem to have the gift of the English language sufficiently to convey what to me is the importance of this feature. I feel some of us are inclined to think that it is a bother and a thing which is apart from ourselves, while, as a matter of fact, it has to do with our own business well-being as well as of benefit to the individual.

Savings Bank Plan

"Since the Savings Plan was adopted, 2,429 men in the two years have taken advantage of it. To be sure, accounts were closed; men deposited their money during the season and at the end of the season they took it home or made other use of it. In all, 1,443 accounts were closed. On Nov. 23, there remained 986 accounts in force. At the same time last year there were about 600 accounts open so there is an increase of about 50 per cent. This does not represent in figures what has been done. We found that the men on the boats were sending money to their home banks, 50 per cent more than they had ever done before, so that the figures we have here are in a sense illustrative of what was accomplished. I could spend hours of your time relating instances that have come under the observation of the committee, showing how this feature is making better men, but time will not permit.

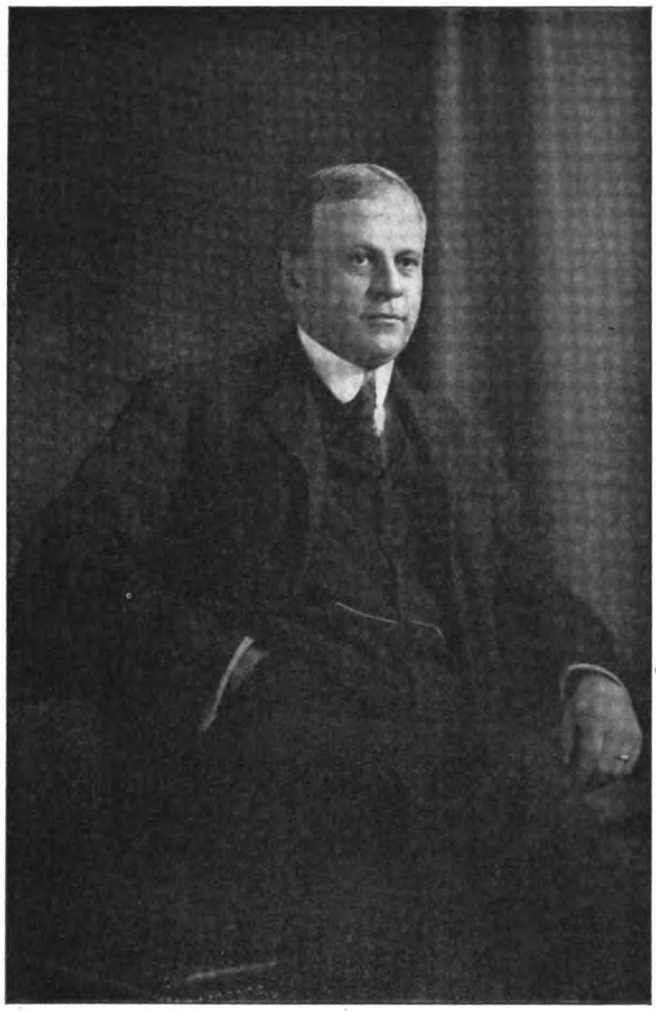
"We have come a long way; we have done well; we have made progress at every step. It may be said that this industrial co-operation has been almost as good for the ownership as it has been for the men; they are broader and bigger in every way. This association has been conducting its meetings for a great many years and ownerships are gradually developing into annual meetings for all of their officers, getting the officers into touch with the management, making them feel they are part of the business. Recently you had a meeting here in Detroit of the committee on aids to navigation and each committeeman representative of the members of the association, came away feeling the influence of this improved co-operation.

"I would like to suggest for your thought that this idea be widened. I would like to see a committee appointed — I don't know what it might be called, you might call it an Industrial Committee — that committee might be made up of 12 or 18 men selected perhaps by the men from the representative fleets, this committee to have under discussion all of these matters that pertain to the development of our mutual situation. This committee would discuss the things we discuss in our individual ownership meetings, such as prevention of accidents, how best to promote harmony on shipboard, education, training of ship's crews, how best to encourage men to save money, etc. These men are on the firing line; they can tell us something.

"The name 'Welfare Plan' is not comprehensive enough—the work is bigger and broader—it is the co-operation of owner and men.

"I am not prepared to make a motion in this direction, but I give you the thought because I am so convinced, as is the entire membership of the Welfare Committee, that a broadening of this work is the thing for us to do.

"I want to endorse everything that Mr. Sheadle has said," said Mr. H. Coulby. "I have been very much impressed by two thinngs. One was, I think it was very forcibly brought to our minds, that the stream is still moving forward. That same stream has carried some of the older members over the dam, and each and every year it is drawing each and every one of us closer to it. Along the lines of what Mr. Sheadle has said I think it behooves all that on our section of the river of life we should do our work in the development of this great business on the great lakes just as well and just as faithfully as those that went before.



MR. J. H. SHEADLE,
Chairman of the Welfare Plan Committee

"The Lake Carriers' Association in its charter sets forth one of the reasons, if not the principal reason, for its incorporation, to bring about a better relationship between employer and employe. That, of course, was born at a time when our relations with our men were not quite as satisfactory as they are today, but nevertheless I think it needs just as serious consideration today as it did then. The association is only incorporated for the mutual good of us all. It does not undertake to say anything about dividends or the trade in which a ship shall go. It does not give any large owner any more rights, privileges, or facilities than it gives a small owner and it is not right or proper that it should. So that a man that has only a ship or two does get just as great benefits from the Lake Carriers' Association as the man that has 50 or 100 vessels.

"I think I can safely say that whatever little success there may have been in the fleet that I represent, has been more largely due to that question of personal equation than to any other one thing. I have derived more help, more good practical suggestions, more practical work from the close association with our captains and engineers than in any other way, and it has seemed to me that the members of this Lake Carriers' Association have neglected to take advantage of that great influence that is lying at our doors ready, willing and able to help us if we only take advantage of it. I am frank to say, and I think it is true with a good many of us, that we have ships in our fleet that I do not get aboard in any one year, so we have to send men out on those ships and they know more about the conditions than I do. I would like to see some such committee formed as has been outlined by Mr. Sheadle, and I would like to see them at our annual meetings, sitting in these front rows. There is no question that I have heard come up in the Lake Carriers' Association that I venture to say 99 per cent of the captains on the lakes know as much about it as I do and probably more. If we had these men here when these questions are taken up for discussion, I think it would liven us up a little bit and surprise us at the information they could give us.

"I have heard a good deal of talk that our welfare plan and our savings plan are going a little too far along the lines of paternalism. I am not a believer in paternalism and I would be the last man to advocate a plan of paternalism. I have never been able to look at it in that way. Did it occur to you while Mr. Livingstone was reading his annual report and while Mr. Sheadle was speaking on the welfare plan, that in 1912 we did the largest business on the lakes in its history. The country

generally all over was prosperous and in my connection with the great lakes never before have I ever seen a record year where we did not have a great deal of difficulty and at times had to spend a great deal of money in getting men to man our ships. I have never seen a year where there was good business on the lakes where we had a better supply of good men than we had last year. In striking contrast to that condition on the great lakes I do not know of any other industry in the United States, whether it was the mines, steel mills, blast furnaces, railroads, in the structural and building trades, where there was not an absolute shortage of labor. I could stand here and give you a great many instances where it was impossible for them, during the last half of 1912, to run over 75 or 80 per cent of their capacity, because they were unable to get men. I don't know of anything that speaks better for what has been done on the lakes than that. The savings plan has nothing of paternalism in it. The welfare plan has nothing of paternalism in it. It is just simply creating an opportunity for the men on board the ships to save their money, making it easy for them to save their money. They do not have to put it in the savings plan if they don't want to.

How the Men Are Saving

"On one of our boats last year I was surprised and disappointed to find only two men used the savings plan. I timed my visit on board that ship to be on board pay day. I sat in the captain's office and I had the captain ask each man how much he was going to send in through the savings plan. As each man said "None," I asked if he did not think it was a good thing, and I found every one of those fellows had all made other arrangements, for instance, there were quite a number who were paying for homes, a number were sending money home, and there was not one man on board but had all arrangements made to save his money. They sent their money home, where they had a place for it. The savings plan does not show the full savings on board the boats.

"Things in this country are going to be different. If we get a good committee working with this Lake Carriers' Association, coming to our annual meetings, taking part in our discussion of things, it will be to the benefit of us all. I think it is a splendid idea.

"There is one thing I am particularly interested in which the Lake Carriers' Association has not taken it up as a body. I believe the time has arrived when the association should take it up as an association and work together and see what they can do, and that is the question of personal safety on board ships, the elimination as far as we can of personal injury. I think if any man here will go over each personal injury case that happens on his own ships, he would find a great many of those accidents could be avoided with a little care, discipline, and waking the fellows up. We had one case on our boats, cleaning the windows of the cabin, where it was close to the hatch where there was hardly room for a man to pass. It was annoying to me that on that boat in two years we had bad accidents to men cleaning those windows before we got them wakened up to the fact that a rail was all that was necessary. They just got a little bit careless. If we could get all our captains and engineers interested in these things and make statistics of accidents that happen on every boat and see what we could do on our ships to prevent these accidents, it would be a good thing; but the captains and engineers and men on the boats are the only fellows that can work that out for you. You can legislate all you want to, but you have got to go further than that. I want to leave that thought in the minds of the members as to whether we should not avail ourselves of the experience of these men, who get right out on the firing line. They are the men who do the things after all when it comes to handling these ships. They are the fellows that do the work and I would like to see a committee of captains and engineers with their fleet men come right into our meetings and give us their help. We need that in solving this problem and it is for the good of us all.

I only want to bring out that question of personal injury on the boats as one of the things where united effort on the part of all of us is needed. It will save you money, it will make better feeling and there is nothing of paternalism in it. It is a duty we owe to these men."

Committee of Twenty

Upon motion of John Craig the executive committee was authorized to take up with the various owners the question of appointing a committee of twenty to be selected from the captains and engineers of various fleets to work in conjunction with the Lake Carriers' Association and to meet annually with it.

F. B. Smith, fleet engineer for the Pittsburgh Steamship Co., and Thomas Durkin, fleet engineer for the Cleveland-Cliffs Iron Co., addressed the members on the subject of whistle signals. It has been observed that whistles of uniform size on many steamers do not produce a uniform volume of sound. It was the opinion of both Mr. Smith and Mr. Durkin that not sufficient care was exercised in examining the transmission gear between the boiler and whistle and that the gear should be examined frequently to remedy any fault in installation or upkeep. Mr. Smith also thought that it might be well if a committee of engineers had access to the laws of other countries governing the inspection of steam vessels, owing to the growing tendency of making the laws of other countries apply as well to the United States. He felt that they were frequently handicapped in their visits to Washington by this very thing.

Care of Whistle Gear

Regarding the care of whistle gear, upon motion of Mr. Coulby, Mr. Durkin and Mr. Smith were appointed a committee to put the matter in shape and send it to President Livingstone to be in turn prepared by him in the form of a bulletin to be sent to owners for transmission to the vessels. "In this way," said Mr. Coulby, "we will discover whether the fault belongs to us or to some other fellow."

A brief report on the hearings at Washington of the Wilson and Hardy bills was made by Mr. Goulder, who reported that there is little prospect of the bills passing in their present shape and probably not at all during the present session.

John Craig related the general conditions surrounding navigation in the Maumee river and the growth of Toledo and its importance in lake trade, and upon motion of Mr. Coulby the lake carriers endorsed the recommendations made by the Toledo Chamber of Commerce as being of general service to the lakes.

Aruthur Sullivan, of Chicago, reported what had been done by the city of Chicago to eliminate obstructions from the channel. The sum of $4,500,000 has been appropriated for bascule bridges by that city.

Archie Thompson, of Cleveland, was elected member of the board of directors in place of Capt. Edward Morton, retired; L. C. Waldo, of Detroit, in place of F. W. Gilchrist, deceased; and Joseph Rogers, of Buffalo, in place of J. J. H. Brown, deceased. It was also recommended that the directorate be increased from thirty to thirty-five. The board of directors now stands as follows: J. H. Sheadle, H. Coulby, John Mitchell, H. D. Goulder, W. C. Richardson, J. S. Ashley, S. P. Shane, Archie Thompson, W. H. Becker, W. A. Hawgood, Walton H. McGean, A. F. Harvey, A. T. Kinney, of Cleveland; Wm. Livingstone, L. C. Waldo, of Detroit; D. Sullivan, C. W. Elphicke, of Chicago; Joseph Rogers, Charles M.

Heald, W. E. Lloyd, John J. Boland, Buffalo; G. A. Tomlinson, Duluth; Howard L. Shaw, S. P. Cranage, Bay City, Mich.; John Craig, Toledo; H. S. Wilkinson, Syracuse; W. M. Mills, North Tonawanda, C. D. Dyer, Pittsburgh, and W. H. Smith, Montreal.

Only one change was named in the executive committee, G. A. Tomlinson taking the place of J. J. H. Brown. The members of the executive committee are: Wm. Livingstone, chairman; H. Coulby, J. H. Sheadle, G. A. Tomlinson, John Mitchell, Charles M. Heald, D. Sullivan and S. P. Shane. Alternates: J. S. Ashley, A. F. Harvey, W. C. Richardson, W. E. Lloyd, W. A. Hawgood and H. S. Wilkinson.

Officers were re-elected as follows: President, Wm. Livingstone; vice president, J. H. Sheadle; general counsel, Harvey D. Goulder; treasurer, Capt. George P. McKay; secretary and assistant treasurer, George A. Marr.

It was at this point that Mr.Coulby paid a fine tribute to Rumsey. He thought that the stockholders and not the directors should re-elect Rumsey to the office of chief shipping commissioner, exactly as they had elected the officers, saying:

Fine Tribute to Rumsey

"I think that, notwithstanding we have had one of the most pleasant meetings, we were all more or less disappointed that we did not see Al Rumsey standing at the foot of the stairs to chase us up here. He told me he had rounded out 30 years with the Lake Carriers Association. That is a long time. He has seen a good many come and go. The work that has been given him to do has been done as well as, and he has been as loyal to the interests he represented, as any man that has ever been connected with these lakes. We can all fancy him lying home in his room, and I think he has been with us in sympathy. He will feel it very keenly that he is not here today. Whenever the day comes—may it be far distant—when the pitcher goes to the well for the last time, you will never see another like him. He has a peculiar individuality and in himself I think he portrays the development of this association as much, if not more, than any other man. While it may be the function of this association to appoint a chief commissioner, I believe it would be, under the circumstances, a particularly graceful thing for us as stockholders to depart from the usual rule and ourselves here today join together in electing him as chief commissioner for the ensuing year. I will make that motion."

The session ended with the annual dinner at the Hotel Pontchartrain in the evening. No dinner bubbling with innocent merriment and spontaneously flowing with such good feeling has ever been held by the association. It will be long remembered as one of the happiest occasions of its kind. The evening was one of singing and jesting, but nevertheless a current of serious feeling occasionally arose to the surface, as for instance when the Rev. Joseph A. Vance suddenly changed his theme and said: "There is a greater tonnage on board than ore and coal and grain; the tonnage of human nature, and it has a tendency to sink faster than iron ore."

The remark was not lost sight of by Mr. Coulby, who when he arose to speak some minutes later declared that their whole day had been spent in considering this tonnage of human nature, how it might be improved and uplifted, and that not during the whole day was a single moment devoted to material costs—a statement which was absolutely true.

Pittsburgh Steamship Co. Meeting

The annual meeting of the officials of the Pittsburgh Steamship Co., with their masters and engineers, opened at the Hollenden, Cleveland, on Jan. 21, the first three days being devoted to the masters and the last three to the engineers.

In his opening remarks, President H. Coulby complimented the masters on the operation of the fleet during the year. He declared that it was the most successful that the company has had. The major part of the time of the opening day was devoted to the question of inside and outside courses, which practice was formally adopted by the vessels of the Pittsburgh Steamship Co. a year ago. The opinion was practically unanimous that the move was a very good one.

On the second day Hermon A. Kelley, counsel for the company, addressed the masters on the rules of the road. This has been Mr. Kelley's annual topic and he has endeavored annually to make the masters see the rules not alone from the pilot house but from the point of view of the trial table as well. He has dealt at great length upon the importance of carefully observing passing and other signals. The result is apparent in the balance sheet.

F. B. Smith, fleet engineer, led in the discussion on safety appliances. Mr. Smith is a member of the committee on safety of the United States Steel Corporation and has devoted a great deal of time to studying this subject. It is the settled policy of the Pittsburgh Co., to do everything possible to minimize the number of personal injury cases. It does not want accidents to happen through lack of forethought on its own part.

The third day was devoted to loading and unloading problems in which the dock managers at both upper and lower lake ports took an active part. The appointments of masters were announced. Capt. Fred A. Bailey will bring out the new steamer, James A. Farrell; Capt. Samuel C. Allen will bring out the new steamer, Percival Roberts Jr., and Capt. F. J. Crowley will bring out the steamer, Richard Trimble.

F. B. Smith, fleet engineer, had general charge of the meeting with the engineers and went very carefully over the subject of safety appliances with the engineers. The appointments were also announced for the season. M. Toner goes with Capt. Bailey into the Farrell, A. W. Armson goes into the Percival Roberts Jr., and J. F. Walsh into the Trimble.

Fireboat for Portland

A fire boat is being assembled at the Supple yard at Portland, Ore., by the Smith & Watson Iron Works for service in Portland harbor. The hull of the fire boat was constructed at the yard of Johnston Bros., Ferrysburg, Mich., and shipped to Portland in a knocked down condition. The new fire boat, which is to be known as the David Campbell, is 125 ft. long, 27 ft. beam and will draw 9 ft. of water. Power will be supplied by two compound engines supplied with steam from two Ballin water tube boilers. The new boat will burn oil.

Smith Coal Dock Purchased

The C. H. Little Co. of Detroit, Mich., has purchased the coal docks of Stanley B. Smith with a frontage of 200 ft. on the Detroit river at Ecorse. It is understood that the Little Co. intends to make extensive improvements and to make it possible for the largest class of carrier to be fueled at the dock. Three pockets will be immediately added to the dock with a capacity of 200 tons each. This dock is one of the best on the lakes.

The Hamburg-American Line announces that the steamship Imperator will make a trial trip of eight days, starting from Hamburg, April 27. When completed she will be the largest vessel existing, though she will not hold this distinction long.

Great Lakes Protective Association

Its Four Years of Operation Has Been Attended With Most Gratifying Results in Reducing Insurance Premiums

J. S. ASHLEY

THE annual meeting of the Great Lakes Protective Association, which was held in Detroit, Jan. 17, was a most gratifying affair. As known, this organization was formed four years ago to consider the general subject of insurance on the great lakes. A critical situation existed. Losses had been numerous and costly and underwriters were much disturbed over the general situation. Some of them were actually retiring from the vessel field and those that remained were charging so stiff a premium that only the strongest vessel companies could survive under it. It virtually meant that vessels had to declare a 6 per cent dividend to the insurance companies before they could begin to earn anything whatever for their own stockholders. Obviously, the smaller class of tonnage which of late years has had a struggle to exist on the lakes was put altogether out of reckoning. It was quite clear that something would have to be done. Vessel owners were complaining of the premiums and were seemingly oblivious of the fact that the premiums were high merely because of the fact that the risks, which they themselves created, were great. The insurance companies are virtually only collection agencies; they have to get the money first of all from the vessel owners before they can pay any losses whatever.

Forming the Association

Largely through the great interest taken in the subject by J. S. Ashley, the vessel manager for M. A. Hanna & Co., this fact was pertinently brought home to the vessel owners and as a result of his interest in the subject the Great Lakes Protective Association was formed to carry a part of the insurance on the lake fleet, and by the constant counsel of owners and masters alike to bring about a state of more prudent navigation and more careful observance of the rules of the road.

The association began its life four years ago by carrying 5 per cent of the total risk. Concretely stated, it lost in its operations during the first year, 1909, 7.5 per cent, or $14,129.03. During 1910, it earned 14.5 per cent, or $33,279.07. During 1911, it earned 34.5 per cent, or $46,483.26. During 1912, it earned 46.1 per cent, or $67,733.05.

The figures speak for themselves. The association has not for one moment lapsed in its campaign of prudence and the results are certainly very real. The season of 1912 was especially fortunate, as with one exception not a steel vessel was lost. One steel vessel alone has been abandoned as a total constructive loss, but she may yet be recovered. During the four years that the association has been in existence the underwriters, instead of making little or no money at the business, have earned an average of 20 per cent. During 1912 they earned well over 50 per cent.

The Great Lakes Protective Association deals in practical things. Since its organization it has reduced the valuation of steel tonnage from $53.50 per gross ton to $51, and has reduced the premiums from 6 per cent to 5¼ per cent for the preferred class. In view of the excellent showing of 1912, a further reduction will, of course, be secured. Vessel owners believe that it should be placed upon the basis of 3½ per cent, but the underwriters are holding out for 4¾ per cent.

J. S. Ashley, chairman of the Great Lakes Protective Association, in his annual report, made the following observations:

Chairman Ashley's Report

"It is a little early to submit results for the year of 1912, as comparatively few claims have been adjusted, and the figures which we will present for comparison, therefore, should be given sufficient elasticity to cover whatever small additions or possible reductions may occur, when the final results are accomplished. The apparent result of this year's operation, however, has been of such a character that we feel the membership is entitled even at this early date to a resume of its operation. Consequently your committee has carefully examined and computed our losses under these policies, utilizing all available information, carefully examining the damage reports received from the masters, combining the estimates of our subscribers received from Bulletin No. 53 and the reports on surveys submitted by R. Parry-Jones, and the result submitted will indicate beyond question that 1912 will be a much more profitable year for the association than any previous one.

"So far, in working out our 1912 policies, we have had but one disaster which may result in a total loss, the Keystorm, and even in this case there is reason to believe the vessel may be salved this winter. Our particular average claims are few in number in consideration of the number of vessels operated this season, every seaworthy vessel being in operation. It is gratifying to know that with all vessels under operation such comparatively few serious disasters have occurred, and considering the prevalence of rain, thick weather and fogs over the entire lake regions during a considerable part of the season we feel that the corrective influence of your association is beyond question. Our subscribers have taken an active interest in the prompt distribution of bulletins and other aids to navigation, our navigating officers have conformed to our rules and suggestions with alacrity, making it possible to control the navigation of our vessels with a degree of uniformity. We are impressed with the manner in wihch our masters co-operate with us in all important matters; their compliance with the regulation of loading draughts; their strict application of pilot rules; of giving and answering passing signals; the reduction of complaints relative to crowding the courses; the passing of other vessels going in the same direction in narrow channels; the adoption of the separate courses on Lake Huron and the many other important rules and suggestions which have been given. We rarely have complaints regarding these matters, but we learn with surprise that some of our members have seen fit to criticize their masters for their caution in staying in shelter or at anchor when in the master's judgment such action was for the safety of his vessel.

Staying in Shelter

"It is a difficult matter to obtain an official declaration of these cases, as the officers will not subscribe their names through fear of their positions, but in order that subscribers and officers may be assured of the position of this association, we refer again to our Bulletin No. 33 and reissue of our Resume of Bulletins, to the effect that the Great Lakes Protective Association assures its active

defense to every officer where criticized for delay, or any other thing where this has occurred in exercise of the precautions enjoined by law or government regulations, or by the suggestions of this association.

"A great deal has been accomplished and results obtained that could not reasonably be expected during the short time your association has been in existence, from a loss in 1909 of 7 per cent to a profit in 1911 of 34 per cent and prospects for a profit of 46 per cent in 1912 is a very gratifying result of our labors. The committee wishes to thank its members and navigating officers for their loyal support in carrying out its rules and recommendations, without which these very gratifying results could not have been obtained.

Room For Improvement

"Still we feel that there is room for improvement. A number of accidents have occurred this year which could have been avoided. It is, therefore, the earnest desire of your committee that each subscriber, associate member and officer continue with redoubled effort in this work that we may perfect the operation of our vessels so that all avoidable accidents may be entirely eradicated. The work of the association should be thoroughly discussed at the annual meetings of vessel officers held by many of our subscribers during the winter. It would be well to freely discuss the accidents occurring to all vessels during the season as tabulated in The Bulletin and suggestions made to avoid recurrence. Your committee will welcome any suggestions which may come from this source.

COMPARATIVE RESULTS.

Year.	Net revenue.	Net disbursements.	Loss.	Profit.	Per cent.
1909	$189,913.04	$204,042.07	$14,129.03	.....	7.5
1910	229,515.30	196,236.23	.....	$33,279.07	14.5
1911	134,184.23	87,700.97	.....	46,483.26	34.5
1912	147,023.46	79,250.41	.....	67,773.05	46.1

It will be noted in the report that the Great Lakes Protective Association shows its active defense of every officer where criticized for delay by his owner. Discussion was invited by Mr. Ashley upon this subject after the reading of the report and it was most actively engaged in.

Captain D. Sullivan said that while a master should not be criticized for exercising caution, cases might arise where caution might be unduly stretched. He gave as an instance one of his masters who had sought shelter under Long Point while en route to Buffalo with grain, and had remained there for five days, though other vessels were reaching port in safety. In this particular instance, Capt. Sullivan was convinced that the master was not governed by prudence merely, but desired to reach port at such a time that it would be impossible for him to unload and leave again before the regular insurance season expired and would, therefore, end his season's work, though his pay, of course, went on.

Committee Suggested

"It is pretty difficult," interposed H. Coulby, "to make a general complaint without specifying an individual incident. The principal thing is to see that every captain gets a square deal."

"This looks to me," said J. H. Sheadle, "like a middle of the road proposition. Some owners, less equable in temperament than others, are probably fretful of delay, but the matter should be adjudicated, and for this reason the appointment of a committee of masters to act in such instances would be a good thing. The master would then be assured of a hearing by his peers."

Mr. Ashley suggested the appointment of a committee of 15 masters to deal with such cases.

"Masters," said George Steinbrenner, "generally have some excuse for delay and usually it is a good one."

"I don't believe in discharging a man because he has had an accident," said Harvey D. Goulder, counsel. "The thought of having a meeting of masters to act on these questions is a good one. Owners are in earnest when they say that caution is necessary and want no deviation from that rule."

"Mr. Goulder is a lawyer," said Mr. Coulby, "and I don't agree with all that he says. The violation of a rule without penalty is a waste of paper. What the captain wants is a disinterested tribunal. In our fleet we have 12 captains to pass on facts and it is very helpful and satisfactory to us in the management of our fleet. We all make errors of judgment, but there is a great difference between an error of judgment and a direct violation of rule. Take the one of passing in the rivers, for instance. There is a possible gain of 15 minutes and a possible damage loss of about $70,000. The odds are too much and it is not wise to take the chance. We should not get to the point of telling an owner how to operate his boat. The committee of captains of our fleet passes on facts, but have nothing to do with the final action of the management. We had a case during the past season where one of our 600-foot steamers stranded and the accident cost us $50,000. The case was investigated by our committee and the master was found at fault, but it was purely an error of judgment and the master went back to his boat."

The Advisory Committee

Capt. W. C. Richardson said that the master should carry out the rules and should be punished for flagrant violations. He believed the vessel owner should work closer with the master and that it would produce a better feeling all around and promote efficiency.

A committee will undoubtedly be appointed to work in conjunction with the executive committee of the Great Lakes Protective Association upon this subject.

President Livingstone, of the Lake Carriers' Association, was made an ex-officio member of the association. The advisory committee was re-elected as follows: J. S. Ashley, J. H. Sheadle, W. C. Richardson, H. C. Coulby, S. P. Shane, W. H. Becker, Charles L. Hutchinson, of Cleveland; D. Sullivan, Chicago; H. S. Wilkinson, Syracuse, N. Y.; Charles M. Heald, Buffalo; Wm. Livingstone, Detroit.

Carrying More Insurance

The underwriters were invited to meet with the association and spent the whole afternoon discussing the various features of the trade, but no conclusion was reached regarding premiums.

The sentiment of the association is to carry a larger portion of its own risk in the future. Some of the members desired to increase it to 15 per cent and others as much as 50 per cent. There was considerable difference of opinion as to the exact amount, but the preponderance of sentiment seemed to be in favor of the larger sum. The exact amount to be determined upon was finally left to the executive committee.

Steam Dipper Trips

The dipper dredges Mindi and Chagres, operating in the Atlantic entrance channel and in coral rock excavation for the new piers of the Panama Railroad Co., at Cristobal, have been equipped with steam dipper trips which a test of six months shows to be successful. The trips were installed by the dredge crews, under the direction of one of the cranemen, Henry Cartier, who selected the material mostly out of scrapped French machinery.

The dredges, mounting 5-yd. dippers, are used entirely in rock, which when necessary, has been partly broken up by the operations of the drill-boat Terrier. They are cutting channels of a minimum depth of 42 ft. at mean tide, and this requires dipper

handles of the great length of 62 ft., while the boom supporting the dipper shaft is 50 ft. long. Because of the momentum of the heavy booms and dipper, the bucket is discharged on the swing, into hopper barges moored alongside the site of excavation.

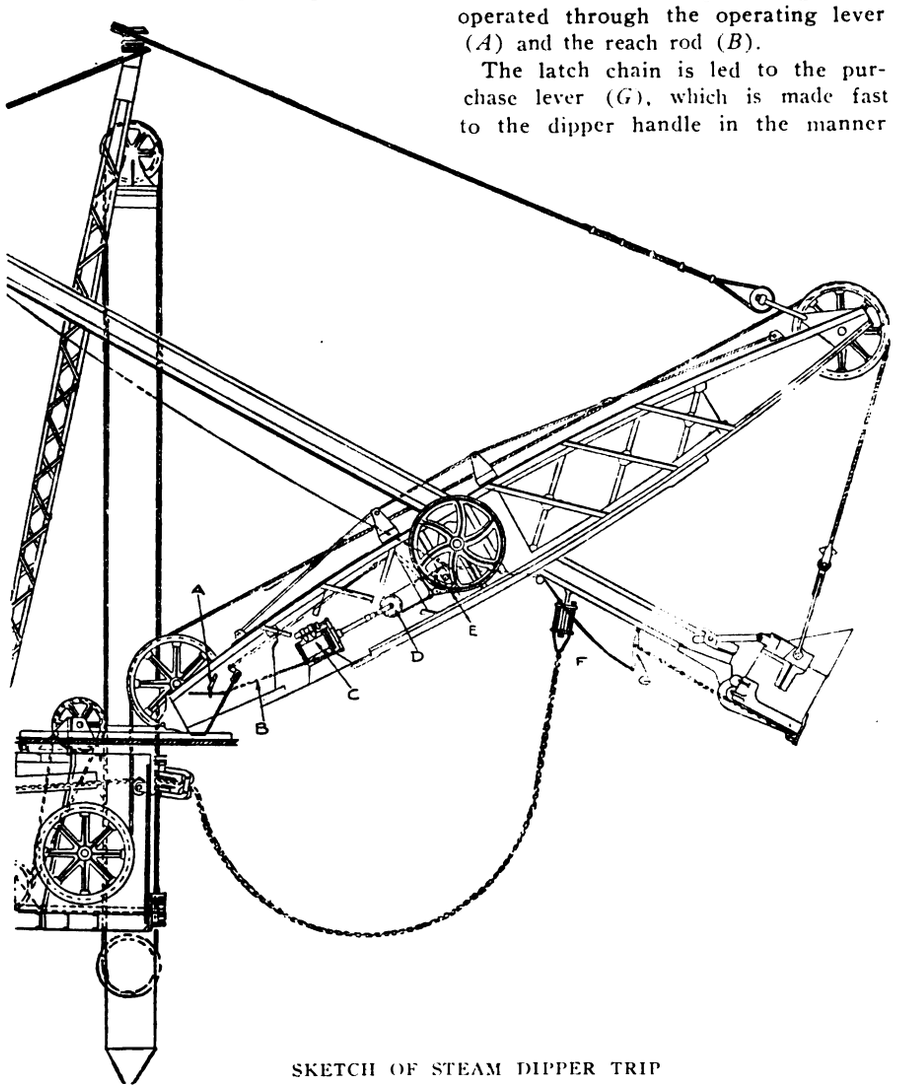
This requires a quick-acting trip, to avoid spilling over the edge of the barge on the return swing. Operation by hand was slow and uncertain. because of the weight and accumulated slack in so long a trip line, and required the use of both hands by the craneman. It was necessary that a tripping device be both positive in action and simple in construction, because of the arrangement of boom and dipper stick. The device had to be so arranged that the tripping line would not have to be overhauled, on a drum or otherwise. It will be seen by the accompanying sketch that the Cartier device consists of a steam ram (*C*), mounted on a foundation in an out-of-the-way position on the interior of the boom. The steam exhausted from the operation of the ram is discharged below the surface of the water, in order that it may not obstruct the operator's view.

The cylinder is 5-inch bore and has a stroke of 8¼ inches. The piston rod carries the equalizing sheave (*D*), and the jamb movement of the ram piston is decreased by allowing the shock to be taken up in two heavy ½-in. x ½-in. springs, 3½ in. long, mounted on the supporting guide arms for the equalizing sheave. The cylinder valve is of simple design and operated through the operating lever (*A*) and the reach rod (*B*).

The latch chain is led to the purchase lever (*G*), which is made fast to the dipper handle in the manner shown, and a ½-in. flexible steel cable (*F*), is made fast to the opposite end and led back over the small idler to keep the slack of the line from becoming entangled. It is then led over one of the two idler sheaves (*E*), mounted on a stationary shaft parallel to each other, thence over the sheave (*D*), back over the other idler sheave (*E*), and up and dead-ended at the top end of the dipper handle. The 8¼-in. movement of the ram piston takes up 16½ in. out of the line to overcome the necessary operating slack and pulls on the latch, this being sufficient to secure positive action. The line's being attached as shown overcomes the necessity of winding in and out the otherwise free end upon a drum, this line being free to travel with the dipper handle over the idler sheaves (*E*) and the equalizing sheave (*D*)

The closing of the door is accomplished by its flat surface striking the water with such force that it not only closes, but takes up the slack in the tripping line (*F*) and pulls the piston to a starting position in the ram.

The saving in time and the increase in yardage through use of this device cannot be arrived at, as no efficiency tests have been made. It is known, however, that a considerable increase in the yardage has been achieved.



SKETCH OF STEAM DIPPER TRIP

United Fruit Steamer Pastores

Workman, Clark & Co., Belfast, Ireland, have just delivered to the United Fruit Co., the steamer Pastores, for service between New York and the West Indies. The Pastores is a twin-screw steamer of 7,780 gross tons and 7,500 I. H. P. She is 498 ft. long and 55 ft. beam.

Her ventilation system, while designed for the cooling of a banana cargo according to the best modern method so as to preserve the fruit during its carriage through the tropics, is adapted to keeping the temperature comfortable in the spacious accommodations allotted to the tourist passengers, of whom the ship can carry 147. The Pastores in every respect is a model of cool comfort.

In the cooling process the air is subjected to four stages. The holds in which the fruit is stored are insulated. The sides of the ship are lined in the interior with galvanized sheet steel, backed with felt, silicated cotton and cork. A wooden partition provided with sliding shutters is built up a foot apart from the ship's sides. Exhaust fans driven by dynamos draw the air along the sides and reduce the heat of the fruit from 85 to 50 degrees. The heat from the air is further reduced by being treated with brine. The heat given from the brine is subjected to C_2O gas and the heat from the gas to sea water before it is discharged into the sea after cooling saloons, cabins and other parts of the ship.

Charles F. Roland, commissioner of the Winnipeg industrial bureau, Winnipeg, Man., has sent out an enormous calendar illustrating the growth of Winnipeg during the past decade. This city of the northwest has certainly made astounding strides.

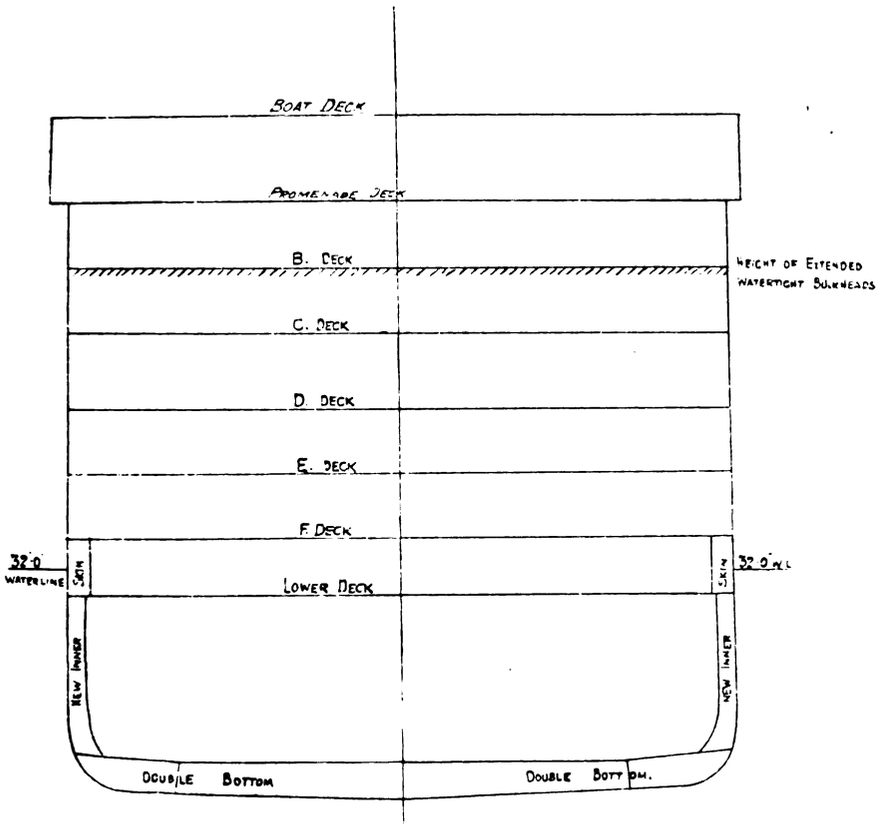
Olympic's Inner Skin

The White Star Line has received advices from Liverpool regarding the progress made in the important construction work on the mammoth steamship Olympic, now at the Belfast yards of Harland & Wolff, and the steamer has now been definitely scheduled to leave Southampton on April 2, sailing from New York on the return trip April 12, for Plymouth, Cherbourg and Southampton.

The chief object of the construction work, which will entail an enormous expense, is the introduction of an inner skin of heavy steel plates, continuing, in effect, the present double-bottom well above the water-line and providing considerable additional protection throughout the hull. The recent published reports to the effect that oil-fuel would be transported between the outer and inner plates of the Olympic is entirely unfounded. Coal will continue to be used as the only fuel for the big steamer.

Throughout the Olympic the builders are placing a number of additional water-tight bulkheads of exceptional strength, several of them being carried through to the "B" deck, which is 40 ft. above the water line. These new bulkheads and the new inner skin will increase the flotation capacity to the utmost and enhance the margin of safety provided in the Olympic far beyond all previously recognized standards. In fact, the Olympic will embody everything that modern marine engineering can devise.

Similar safeguards are being introduced into the new Britannic, the 50,000-ton triple-screw steamer now in course of construction for the White Star Line.



CHARACTER OF OLYMPIC'S ALTERATIONS

Profits of Oil Tankers

As an evidence of the excellent freights now ruling in deep sea sailing, some owners of oil tankers have been able to secure profits which are more than sufficient to pay them more than 100 per cent on a year's working. One tanker which cost $400,000 to build, recently completed a round trip from England to the United States in six weeks, the profit on the trip actually being $200,000. Owners who were fortunate enough to have their boats free when the period of high freights began are certainly reaping a rich harvest. A tanker which was recently built has been chartered over a term of years at a rate of freight which will return her owners 20 per cent per annum clear profit. Some owners of tank tonnage of course are only making fair profits, having chartered the vessels at low rates before the present period set in, but those that were running their vessels wild are now reaping a harvest, the like of which has not hitherto been known.

Steamboat and Freight Train Collide

One would naturally suppose that among the things impossible would be a collision between a railroad train and a steamboat, but such are the vagaries of river navigation in the United States that such a thing has actually occurred. A freight train on the Memphis branch of the Louisville & Nashville railroad collided with the packet boat Lochie S in the flood at Cumberland City, the packet having unknowingly in the backwater been navigated to a point over the railroad's right of way. The steamboat saw the freight train coming and blew an alarm, but the locomotive engineer was not posted on vessel signals and, being night, he did not see the strange intruder in time to stop. An interesting legal issue arises. The steamboat company claims that it was within its rights as the vessel was on the waters of a navigable stream and that the rights of navigation are paramount; the railroad claims that it was within its rights as the train was on the company's tracks. Doubtless no admiralty court has had to decide such an issue before. The damage was only to the steamboat as the locomotive was not injured.

New Steamers for Cheaspeake Steamship Co.

The Maryland Steel Co., Sparrow's Point, Md., is building two steamers, duplicates, to be known as the City of Richmond and City of Annapolis, for the Chesapeake Steamship Co., Baltimore, Md. The steamers will be 277 ft. 3 in. over all, 260 ft. 6 in. between perpendiculars, 43 ft. beam molded, 53 ft. beam over guards, accommodating about 400 passengers and carrying 600 tons of freight. The hull will be subdivided by five watertight and two non-watertight bulkheads. The staterooms will be fitted with all conveniences such as running water, telephone and electric fans. The steamers will run between Baltimore and Richmond.

The Safety Car Heating & Lighting Co. has received an order from the United States lighthouse department for seven type "C" Pintsch gas buoys complete with mantle lanterns. These buoys are to be placed in the Elizabeth river, Norfolk, Va., and will mark the channel to the Portsmouth navy yard.

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A Sweeping Measure

The Committee on Merchant Marine and Fisheries of the house of representatives has been diligently prosecuting during the past few weeks an inquiry into the shipping combination which controls the oversea trade. The evidence submitted has been of the most illuminating character and quite convicts the foreign pool of deliberately stifling competition in the foreign trade. In order to correct this state of things, Mr. Humphrey has introduced a bill in the house which, if passed, will certainly put an end to this monopoly. The purpose of this bill is to deny the use of the Panama canal to any combination, either American or foreign, which seeks to restrain trade. It will be seen at once that this is of the most sweeping character, because it will involve also the railways which might seek to give an advantage to ships in which they are interested in whole or in part.

In discussing the measure, Mr. Humphrey stated that the evidence already submitted proves that the foreign steamship lines are guilty of every charge that has been brought against them, fixing rates by agreement, giving rebates and resorting to all manner of devices in order to stifle competition. The rates at which freight may be moved from United States ports are fixed by agreement in Europe and whenever an independent line endeavors to enter the trade, the rates are slashed to ridiculous figures for the time being to that particular point. In that way no independent line can possibly observe a sailing schedule, because during the week in which the vessel is to sail the rates to the particular port are practically nil. Obviously manufacturers and merchants will ship by that line which offers the cheapest transportation. Obviously also as soon as the independent line has abandoned the field, rates are again advanced.

Mr. Humphrey appears to be eager to have the necessary legislation enacted before the canal is put into commission and will do all that he can to force the issue. If the bill should be passed, it will mean a great deal to the American ship yards, for it will be instantly productive of numerous orders for new tonnage.

In fact, the foreign trade of the United States is growing to be one of the wonders of the world. Its character of recent years has completely changed; formerly it was an exporter of agricultural products; today it is an exporter of manufacturing products. Agriculture from the exporting standpoint is practically at a standstill whereas exports of manufactures are growing rapidly, having increased $310,000,000 in the past five years. Foreign trade has now reached the enormous total of $2,170,000,000 per annum. This great trade has been built up in the face of numerous obstacles, for it would instantly increase more rapidly yet if the United States had its own merchant marine.

Panama Canal Tolls

Secretary of State Knox's reply to the note of Sir Edward Grey, British minister of foreign affairs, in relation to the remission of Panama canal tolls on coastwise shipping, has created a great deal of discussion, but in our opinion, the position taken by Secretary Knox is unassailable.

Sir Edward Grey in his note protested that the provision exempting coastwise vessels was in violation to the Hay-Pauncefote treaty and in his note suggested that the dispute be submitted to arbitration before the Hague tribunal. Secretary Knox makes the point that such a suggestion is premature on the ground that Great Britain is complaining of something that may not happen. This point is very well taken, because no one really knows what the ultimate settlement of this controversy will be, as Secretary Root is now endeavoring to repeal this particular section and has introduced such a measure in the senate. Moreover, Secretary Knox holds that arbitration should not be resorted to until the two governments have failed to settle by diplomatic negotiations the points at issue. For instance, there is evident confusion in Sir Edward Grey's mind concerning the privileges of domestic shipping. He appears to think that a coastwise steamer can carry freight to a foreign port without paying toll. Secretary Knox does what he can to clear away this misunderstanding by assuring the British government that domestic coastwise trade will not be permitted to extend operations into foreign competitive fields and adds that increased

tolls will not be laid on foreign shipping to balance the remission to American ships.

If Great Britain is not satisfied on these points and desires to further examine the facts, Secretary Knox proposes the appointment of a joint high commission of inquiry. This is a very sensible suggestion, for certainly the two nations should first of all endeavor to settle the dispute between themselves before submitting it to international arbitration. When the facts are examined, it will be shown that Great Britain has nothing to complain about, as coastwise trade is purely domestic.

The conclusion to Secretary Knox's note is, in our opinion, unanswerable:

"It is recognized by this government that the situation developed by present discussion may require an examination by Great Britain into the facts above set forth as the basis upon which tolls fixed by the president's proclamation have been computed. An examination may also be required into the regulations and restrictions circumscribing the coastwise trade of the United States, as well as into other facts bearing upon the situation with the view of determining whether there is any ground for claiming that the act and proclamation actually subject British vessels to unjust and inequitable tolls.

"If it should be found as such then a situation will have arisen which, in the opinion of this government, could to advantage be dealt with by referring the contoversy to a commission of inquiry."

An excellent point has been made by Senator Newlands, of Nevada, who argues that in regard to Panama tolls no arbitration is necessary. He based his remarks largely upon the financial loss that the operation of the canal will cause the United States. Though only one-tenth of the canal's traffic would be American, he said the United States would have to bear two-thirds of the expenditure of keeping the canal open. This fact alone was enough to justify the United States in making what disposition it pleased of tolls that might be levied on American ships The only point to be observed was that the American exemption did not fall as a heavier burden on foreign bottoms. In fixing the tolls, this government has borne that point in mind and the exemption of American ships comes as a burden only to the American treasury. In fact, the Panama canal will open to commerce with exactly the same tolls that are now charged at Suez, and Suez has been in operation for 43 years, with its tolls undergoing a gradual reduction from decade to decade. If Panama begins where Suez virtually ends, it is certainly treating foreign shipping liberally.

There has been some talk in the newspapers that one of the first acts of President-elect Wilson will be to demand the repeal of that portion of the Panama canal act which exempts American shipping from tolls. How he can consistently do this is not clear, since the platform of the Democratic party as adopted at the Baltimore convention contains the following plank:

"We favor the exemption from tolls of American ships engaged in coastwise trade passing through the Panama canal."

The Progressive party's national platform also contained the following plank:

"We demand that American ships engaged in coastwise trade shall pay no tolls."

The Republican party's national platform was the only one that was silent on this subject.

If popular votes, therefore, mean anything, 10,398,000 persons voted for the remission of tolls and 4,502,000 were silent on the subject.

Great Lakes Protective Association

Four years ago a group of lake vessel owners formed the Great Lakes Protective Association for the purpose of carrying a small part of the insurance upon its own vessels and by a careful observance of the rules of navigation to minimize the number of accidents on the lakes which had begun to frighten underwriters and had resulted in such high premiums that only the more powerful companies could operate and carry insurance. In fact, based upon valuation, insurance premiums had during the past 20 years more than trebled. The premiums had advanced to 6 per cent, which, of course, meant that the vessel had to earn 6 per cent for the insurance companies before it could begin to earn anything whatever for its own stockholders. Six per cent is about as much as many enterprises are able to make, and it really meant that some of the smaller classes of vessels, the efficiency of which was rapidly being discounted by the increase in the size of ships and the demands of the unloading docks, were compelled to operate without insurance if they expected to make any money. But even with the premiums charged some of the underwriters were not at all eager for lake business and some, in fact, were withdrawing from the field altogether.

The issue was really a moral one. Certain of the more thoughtful vessel owners were convinced that quite a number of the accidents were avoidable, and would be avoided altogether by absolute observance of the rules of navigation. The results of the four years of operation have amply borne out this view.

During the first year the Association lost $14,000, or 7 per cent. During the fourth year, however, it made $67,000, or 46 per cent, and the underwriters themselves have done even better, as they made over 50 per cent. They were called upon to pay during 1912 only one constructive total loss in a steel steamer and they may not have to pay even that, for there is a chance that the steamer may be recovered. This has been brought about by a deliberate effort to minimzie accidents and to abolish altogether the avoidable accident.

Submerged Water Crib

The New Intake to Supply Cleveland With Water Will be Protected by a Structure Totally Submerged With 32 ft. of Water Over It.

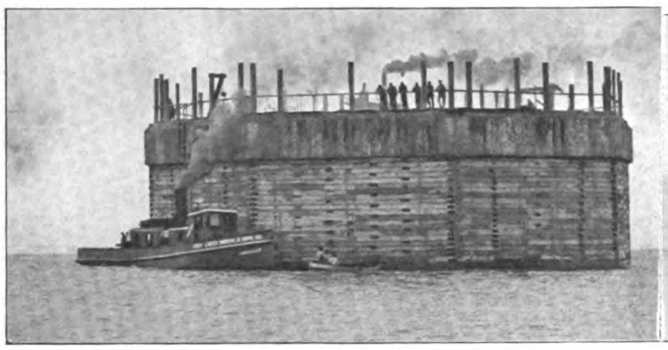
THE COMPLETED CRIB

THE Great Lakes Dredge & Dock Co. has just completed the water works crib intended to eventually protect the intake of the new water works tunnel at Cleveland. Unlike the cribs hitherto constructed for the city of Cleveland, this one is intended to be completely submerged, having 32 ft. of water over it.

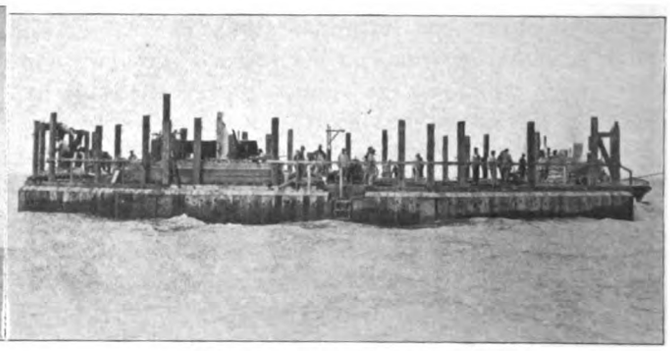
The crib was built at the company's plant on Whiskey Island, construction work beginning in March last. Eight courses, consisting each of 12 x 12 in. timbers, were built up on sliding ways and the structure was then launched on April 13. Construction work continued upon the crib at the plant, however, until forty courses were completed, when it was drawing about 18 ft. of water, carrying about 1,200 tons of stone in the pockets. This was the maximum limit of draught available and the structure was then towed into the outer harbor and built up until 58 courses containing 2,500 tons of stone had been completed. Water was then let into the crib and it was sunk to its present position in the lake. Eight courses were then added to the structure, making 66 courses in all. The house of 14-ft. sheeting was completed in December last.

The crib is octagonal in shape and is 96 ft. across, the well having a diameter of 52 ft. The pockets surrounding the well through which the shaft will be sunk are all compactly filled with stone.

A solid floor has been laid at the twenty-first course and it is the intention as soon as the water works shaft is finished to cut the structure away at the eighteenth course and then by pumping out the water and removing the stone the superstructure will float off. The substructure remaining will be protected by 8,200 tons of rip-rap entirely surrounding it and the well or intake will be covered with a grating of 2¾-in. mesh so fastened that in the event of its being fouled by a vessel's anchor it can readily be removed and replaced by a submarine diver. The contingency is obviously remote.



THE CRIB PRIOR TO SINKING



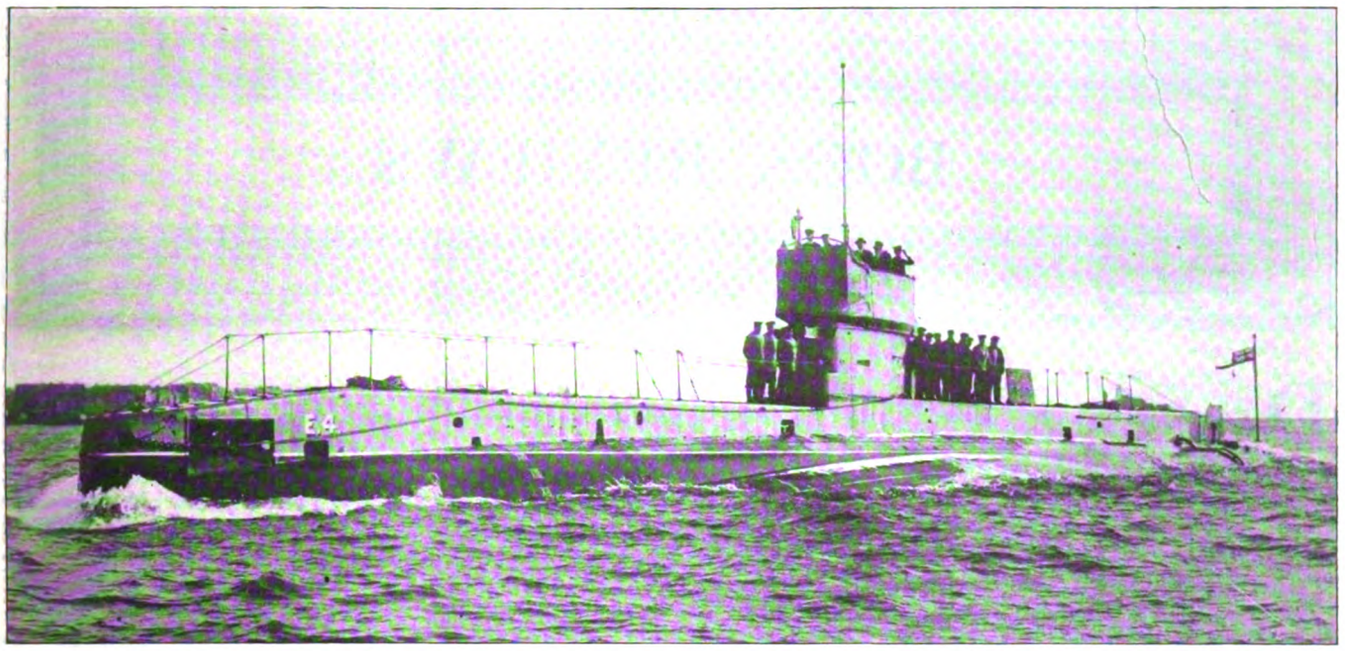
THE CRIB SUNK INTO POSITION

New Passenger Steamer North American

The steel passenger steamer, North American, building at the Ecorse yard of the Great Lakes Engineering Works for the Chicago, Duluth & Georgian Bay Line, was launched on Thursday, Jan. 16. The new steamer is intended exclusively for passenger traffic and in an entirely new service. She will run from Chicago to the head of the lakes, touching at Mackinac island, Sault Ste. Marie and traversing the north shore of Lake Superior on the up trip. On the return trip she will cruise along the south shore of Lake Superior and will enter the Georgian bay district before returning to Chicago. The company was promoted by Robert Davis, formerly passenger agent of the Goodrich line at Chicago. The new steamer is 285 ft. long, 47 ft. beam and 17½ ft. draught.

Steamship City of Bristol

The steamship lines controlled by Sir John Ellerman have just received another handsome vessel, namely the city of Bristol, built by Messrs. Swan, Hunter & Wigham Richardson, Ltd., at their Wallsend shipyard. This is the 14th ship built by them for the Ellerman lines, and they have another in hand. The plans of the City of Bristol and her construction have been supervised by Alexander Dalrymple, the superintending engineer of the Ellerman lines, assisted by R. Sharp. She is a powerful cargo ship, and is to trade in the Hall Line of Liverpool, between the United Kingdom and the East Indies. The triple-expansion engines have been built by the Wallsend Slipway & Engineering Co., together with the three large single ended boilers, which have a working pressure of 220 lbs. per square inch with Howden's forced draft. The City of Bristol is built to the highest class of the British corporation. Her leading dimensions are 465 ft. long overall, 56½ ft. broad, with a moulded depth of 34 ft. The vessel has a poop, bridge and forecastle, with accommo-



ENGLAND'S NEW TYPE OF SUBMARINE "E 4"

This submarine, recently completed at Vickers, Barrow, has three torpedo tubes and twin propellers. She also carries two guns on a disappearing platform. There is plenty of space inside for the crew and provision is made for sleeping accommodations.

dation for seamen and firemen in the poop, and for officers and engineers amidships on the bridge deck. The dining room has seating accommodation for 16 persons, and adjoining it are several comfortable staterooms. In planning the ship much thought has been given to loading and discharging cargo with rapidity. There are 13 steam winches and 18 derricks, one of which is to lift 30 tons, and the remainder have a capacity of from 7 to 10 tons. Wireless telegraphy is installed in the ship. The trial runs took place at sea off the mouth of the River Tyne on Dec. 16, and were successful in every respect, a speed of nearly 13 knots per hour being attained.

Torpedo Boats Awarded

William Cramp & Sons Ship & Engine Building Co., Philadelphia, has been awarded contracts for the construction of three out of the six torpedo boats for which bids were recently opened. The price is $842,000 each. The New York Shipbuilding Co. received the contract for one at $873,500. One will be built by the Bath Iron Works, Bath, Me., for $810,000, and one by the Fore River Shipbuilding Co., Quincy, Mass., at $873,000.

Diesel-Engined Yacht

Paris Singer has ordered a full-powered Diesel-engined yacht from Camper & Nicholson, Gosport, England, of the following dimensions: Length over all, 168 ft.; length between perpendiculars, 149 ft.; beam, 24½ ft.; draught, 9½ ft.; tonnage, 400. She will be equipped with two Polar-Diesel engines of 350 H. P. each at 200 r. p. m., but capable of developing 400 B. H. P. if necessary. The engines will be built by the Aktiebolaget Diesels Motorer, Stockholm, Sweden.

Italian Cruiser Libia

The Italian cruiser Libia, late Abdul Hamid, launched from Ansaldo's yard, at Sestri Ponente, recently, may be said to be "a lady with a past." Ordered when the late sultan's orb was setting, the coyness of the young Turks to meet their financial engagements chilled the ardor of the contracting firm. Work on the ship was accordingly abandoned, and resumed only on her passing under the protection of the Italian government, to whom she fell a lawful prey on the outbreak of the war. Her displacement is 3,800 tons and she is powered sufficient to drive her 22 knots per hour.

Calendars

The Panama canal is a very popular subject for illustrations these days on calendars. The calendars issued by the American-Hawaiian Steamship Co. and the United Fruit Co. have excellent maps of the Panama canal zone and the islands of the Caribbean sea.

The Englehardt Collapsible Lifeboat Co., 116 Broad street, New York, has put out a calendar setting forth the leading particulars of the Panama canal with a map of the territory. Incidentally, of course, the Englehardt collapsible lifeboats are advertised.

The Northern Malleable Iron Co., St. Paul, Minn., has just sent to the trade a beautiful calendar for 1913. It will probably rank very high among the season's calendars. Stanley M. Arthur's "Off For School" is beautifully reproduced in its original colors.

The Submarine Signal Co. has just issued a neat little calendar for 1913, the pictorial part showing an ocean liner passing the Nantucket lightship.

A contract has been awarded by the Argentine Republic to Vickers, Ltd., of Barrow-in-Furness, England, for a new floating dock. It will be of the box type, having a length of 300 ft. with a breadth of 600 ft. and a lifting capacity of 1,500 tons. It is to be delivered within nine months.

The steamer Honduras, built by Capt. James Davidson at Bay City, which has been operating on the coast for the past few years, has been purchased by the Seaboard & Gulf Steamship Co. of Texas, to which she has been under charter for the past two years.

Senator Root has introduced a bill to repeal that part of the Panama canal act which exempts American coastwise vessels from the payment of tolls.

The general offices of the Crane Co., Chicago, are now at 836 South Michigan avenue.

BOOK REVIEWS

DREDGES and Dredging," by Charles Prelini; 279 pages, 6 x 9 in.; $3 net; D. Van Nostrand Co., New York, publishers. For sale by the Penton Publishing Co.

This is a very interesting work. Like editing a newspaper everyone thinks that he is competent to carry on a job of earth or rock excavation, yet there is nothing more difficult than to do such work economically. Dredging is as old as prehistoric man, but it is only within the last 50 years in Europe (and the last 25 years in the United States), that rapid advances have been made in designs and types of machines and the cost of dredging materially reduced. The first hydraulic or suction dredge was suggested in France in 1867, and that was the real beginning of the construction of modern dredges. In 1872 the first dredge of this type was built in America and cutters were first placed on hydraulic dredges in 1878. Since 1890 wonderful strides have been made in the development of dredges. This has been especially so regarding the ladder dredge for mining purposes. Today the ladder dredges used in California in gold mining are said to excel all others. It has only been within the past 12 years that the tailing stacker has been used in connection with these dredges, and this device has greatly simplified the work and reduced its cost. The book is a complete treatise on dredges and dredging, describing types of dredges and methods and costs of dredging. It would seem as though all contractors engaged in this class of work would value it.

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"Warships and Their Story," by R. A. Fletcher; 348 pages, 7 x 9 in.; Cassel & Co., New York, publishers. For sale by the Penton Publishing Co.

This book is a companion book of "Steamships and Their Story," by E. Keble Chatterton, being uniform in size and character. The book is profusely illustrated. It traces the development of the warship from the earliest time and is written in a popular vein. The author certainly goes back far enough, as he mentions the legendary expeditions of Ulysses and Jason. The first sea fight of which a pictorial representation is known to exist was fought off Migdol, at the mouth of the Nile, by Rameses III. Then follows the account of the Greek war galleys and the primitive vessels of ancient times. Nothing in the fighting line has been omitted from the dug-out of New Guinea to the proa of the Maori. The greatest interest, of course, obtains in the latter-day development and in this regard Mr. Fletcher has been a competent reporter.

* * *

"Thermo-Dynamics of the Steam Turbine," by C. H. Peabody; 282 pages, 6 x 9 in.; $3; John Wiley & Sons, New York, publishers. For sale by the Penton Publishing Co.

This book endeavors to give a systematic treatment of the thermo-dynamics of the steam turbine for students in technical schools. Constructive details are considered as far as they are necessary for a proper understanding of the thermo-dynamic computations or as they are related to such computations. The methods are in general these that are accepted by steam turbine designers, but certain methods have been devised by the author either to make the methods more complete or to provide more rapid and precise determinations of conditions and proportions. Students undertaking the discussion of steam turbine are supposed to possess a sound preparation in general thermo-dynamics, consequently the introduction gives only an abstrect of the properties and computations for steam.

* * *

"Practical Marine Engineering," by W. R. Durand; 794 pages, 6 x 9 in.; International Marine Engineering, New York, publishers. For sale by the Penton Publishing Co.

This is the third edition of Prof. Durand's work, but undergoes no change from the second edition as far as Prof. Durand is concerned. Chapters on the steam turbine, internal combustion engines, fuel oil and marine producer gas plants have been added by other authors, namely, "Steam Turbines," by E. N. Janson; "Internal Combustion Engines," by A. H. Ziegler; "Producer Gas Plants," by Godfrey M. S. Tait, and "Oil Fuel," by E. N. Percy.

* * *

"Electric Propulsion of Ships," by H. M. Hobart; 162 pages, 5 x 8½ in.; D. Van Nostrand Co., New York, publishers. For sale by the Penton Publishing Co.

This book is upon a decidedly new and interesting topic. While no vessels with electric drive are as yet in commission two are under construction, while 20 years of engineering experience in applying on a large scale electrical methods of propelling vehicles have materially improved the status of the electrical engineering profession, the electrical engineer, nevertheless, in approaching the subject of ship propulsion with its highly developed methods of many years' standing, cannot with propriety attempt to do more than to place at the disposal of marine engineers and naval architects the special experiences which he has acquired in applying electrical machinery to more or less remotely analogous propositions. The author has, therefore, merely endeavored to provide a bridge over which the marine engineer can make incursions into the electrical engineer's territory, familiarize himself with the electrical engineer's habit of thought and return to his marine engineering problems with a better comprehension of the reasons for the enthusiasm with which the electrical engineer regards the inviting field of ship propulsion by electricity. The author has endeavored to assimilate the marine engineer's data and to place the results before electrical engineers in such a way that it may be useful to them.

* * *

"Practical Design on Marine Single-Ended and Double-Ended Boilers," by John Gray; 78 pages, 4½ x 7½ in.; $1.25 net; D. Van Nostrand Co., New

York, publishers. For sale by the Penton Publishing Co.

This book is intended as a guide to draughtsmen and engineers who are already familiar with smaller type of boilers, but lack the experience necessary to design large or double-ended boilers. The book includes a list of tables which no boiler designer should be without and a lot of useful miscellaneous data. The illustrations are abundant and clear and the whole book is workmanlike throughout.

* * *

"Marine Engine Design," by Edward M. Bragg; 172 pages, 5 x 8 in.; D. Van Nostrand Co., New York, publishers. For sale by the Penton Publishing Co.

This book is devoted to the actual work of laying out and designing the engine and is the result of several years experience in teaching the subject of marine engine design to students of the University of Michigan. Chapters on the design of turning and reversing engines are included. The author directs attention to the desirability of systematic data-keeping. Whenever possible coefficients and factors of safety should be determined from data of similar engines working as nearly as possible under the same conditions. The book is painstaking and clear and should be in the possession of every student of marine engine design.

* * *

"Altitude and Azimuth Tables," by Lieut. Radler De Aquino; 212 pages, 6 x 9½ in.; J. D. Potter, 145 Minories, London, publisher. For sale by the Penton Publishing Co.

This book, now in its second edition, has proved a big success and has been commended by navigators generally. Lieut. Aquino has recently been appointed Brazilian naval attache at Washington. Briefly Lieut. Aquino has worked out spherical traverse tables which solve the astronomical triangle of position without the necessity of resorting to logarithms. The hydrographer of the United States navy says of this work:

"Aquino's purpose is to abridge the extent of the existing tables by tabulating the solutions of the two right-angled spherical triangles into which the astronomical triangle may always be divided, with values of the argument no nearer together than 30 degrees in one case and one degree in the other. To make this plan feasible his purpose is to sacrifice the freedom of choice now existing with reference to the assumed geographical position so placed that the proposed tables may be entered without interpolation between the tabular values of the arguments which are, in fact, designedly spaced too far apart for successful interpolation. The advantage of having one simple rule for the solution of all cases is also somewhat disturbed by necessary variation from the singleness of the rule in order to adapt the proposed tables to varying combinations of data arising from different relative positions of the observer and the observed celestial body. The plan is sound in principle and scientific in conception."

* * *

"Textbook of Theoretical Naval Architecture," by Edward L. Attwood; 518 pages, 5 x 7 in.; Longmans, Green & Co., New York, publishers. For sale by the Penton Publishing Co.

This is the sixth edition of a work that has long been standard. This book has been prepared in order to provide students and draughtsmen engaged in shipbuilders' and naval architects' drawing offices with a text book, which should explain the calculations which continually have to be performed. It is also intended that the work shall serve as a text book for the theoretical portion of the examinations of the science and art department in naval architecture. The sixth edition contains the following additions, viz., strength of beams, davits, pillars and shaft brackets; the "Smith correction" to curve of buoyancy due to distribution of pressure in a trochoidal wave; heel due to gun fire and due to turning; graphic integration, also miscellaneous worked-out examples.

* * *

"Calculations for Marine Engineers," by R. A. McMillan; 333 pages, 5 x 8 in.; $3 net; J. B. Lippincott Co., Philadelphia, publishers. For sale by the Penton Publishing Co.

This book includes all the arithmetic for first and second-class engineers' certificates and the use of four-figure logarithms. It is intended for those candidates for board of trade certificates as first and second class engineers who have attended evening continuation or technical classes during their apprenticeship. The arithmetical papers contain a large number of problems in engineering which have been grouped together to form different sections of the work. The general principles involved in the solution of the problem have been carefully explained and the reader is then shown how the examination questions may be solved by applying these principles. The work is to be issued in two parts, of which this is Part I.

"Shipyard Practice as Applied to Warship Construction," by Neil J. McDermaid; 328 pages, 6 x 9 in.; Longmans, Green & Co., New York. For sale by the Penton Publishing Co.

This book is intended to provide students and others with a knowledge of the actual operations performed in the shipyard during the construction of a warship. The book also embraces a course of lectures given to cadets of naval construction when instructor at the Royal Naval College, Davenport. The book begins with the building slip, which is described to the utmost detail; then follows the preparation of keel plates, transverse framing, longitudinal framing, scrieve board, lining-off frame in double bottom, bevellings, lining-off main transverse bulkhead, taking account of bottom plating, plating shaft recess, beams, bilge keels, deck plating, plating behind armor and so on through every detail. Everything is expressed in the simplest language and the book should be of interest to every student.

* * *

"A Manual on the Rule of the Road at Sea and Precautionary Aids to Mariners," by Daniel H. Hayne; 168 pages, 5½ x 8 in.; The Co-operative Publishing Co., Baltimore, Md., publishers. For sale by the Penton Publishing Co.

Mr. Hayne, who has had twenty-five years' experience at the Baltimore bar, has in this manual codified the laws and court decisions regarding navigation. The manual therefore reaches a new field and supplies information concerning the rules and practices of seamanship which should be of interest to practical navigators, yachtsmen and motor boat owners. To the latter it should be especially helpful, as it acquaints them clearly with their rights in the roadstead. Navigators, of course, are supposed to be familiar with the rules of the road, but nevertheless a court ruling will sometimes put a new light upon a collision case. Conscientious study of this work should be helpful to everyone aboard ship.

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"Panama Canal, What it is," by John Barrett; 120 pages, 5½ x 8 in.; $1.00;. Pan American Union, Washington, D. C., publishers. For sale by the Penton Publishing Co.

The author of this book has been a conspicuous public servant since President Cleveland sent him to Siam as minister many years ago. For a score of years he has been identified with the Pan-American Union, and he has never permitted interest in that subject ever to languish, as countless pamphlets, periodicals and books

which he has produced testify. This one on the Panama canal is a good reportorial story of the great achievement and it is abundantly illustrated with fine photographs. If anyone wants to know all about the canal, and what to see when one gets there, and how to see it, this book is extremely serviceable, for Barrett has brought the facilities of a trained newspaper man to the task and he tells you exactly what you want to know.

* * *

"Manufacturing in Philadelphia — 1683-1912," by John J. Macfarlane; 97 pages, 6 x 9 in.; Philadelphia Commercial Museum, publisher.

Philadelphia is one of the oldest of the manufacturing towns. Richard Townsend, who came over with William Penn, started a grist mill in Philadelphia in 1683, and from that time until 1879 Philadelphia continued to be the leading manufacturing city, when it was surpassed by New York. In 1899 it was displaced from second place by Chicago. While New York and Chicago exceed Philadelphia in the number of establishments and wage earners and in the amount of capital and value of products, the excess is due to the aggregation of smaller industries as a result of their large population. In 1909 the average capital of each establishment in New York was $52,000, and in Philadelphia $82,515, or 57 per cent more than in New York. The names of Philadelphia firms are synonymous with their products. For instance, the name of Baldwin suggests locomotives; Cramps, ships; Brill, cars; Stetson, hats. It is surprising to learn that nearly one-third of all the wage earners in Philadelphia are engaged in the manufacture of textiles. The book is a fine review of the whole manufacturing industry of Philadelphia, and closes with a sentiment which every American can heartily endorse.

"There sailed from Philadelphia in August a steamship carrying a cargo of general merchandise for Brazil. It was big enough to hold twenty-three locomotives with their tenders, thirty-six steel cars and an immense quantity of steel rails and accessories, the rails alone weighing 1,200 tons. The remarkable fact about the vessel was that over it floated the stars and stripes and that this shipment from Philadelphia is the first departure of a steamship carrying the United States flag and bound for South America that this port has witnessed in half a century and possibly longer. May its sailing be a harbinger of the day when it will be no uncommon sight to see the stars and stripes floating over hundreds of vessels sailing out of Philadelphia for foreign ports."

* * *

"Ship Wiring and Fitting," by T. M. Johnson; 4 x 6½ in., 78 pages; Price 75 cents; D. Van Nostrand Co., New York, publishers. For sale by Penton Publishing Co.

This little book is intended to treat in a simple manner the systems of wiring most commonly used in fitting of electrical apparatus on mercantile ships. It is the result of the author's practical experience in fitting up passenger and cargo steamers. Improvements are continually being made in electrical gear for ship work. The system of wiring, however, remains almost unaltered. Ship work is a special class requiring skilled and experienced men, as the conditions met with are totally different to those obtaining in the case of similar work on land. The book is illustrated with a variety of clear and simple diagrams.

Obituaries

Capt. Frank Hebner died at the Marine Hospital in Detroit, on Jan. 29, at the age of 69. He was employed for many years in the White Star Line and later sailed his own steamer, the City of Concord.

Capt. A. J. Huntoon, 71 years old, for many years in command of one of the big Michigan Central car ferries, was found dead in a chair at his home in Detroit on Jan. 23.

Capt. John Doner, who had sailed the lakes since boyhood, died at his home in Detroit on Jan. 26, at the age of 69 years.

Capt. Thomas Naden, master of the steamer Saxon of the Pittsburgh Steamship Co.'s fleet, died suddenly at his home at Sombra, Ont., on Jan. 26. His death was very sudden as he had attended the annual meeting of the masters of the Pittsburgh Steamship Co., at Cleveland, the week before.

Lake Ship Building

The Collingwood Ship Building Co., Ltd., Collingwood, Ont., has booked an order to build a steel passenger and freight steamer for the Pelee & Lake Erie Navigation Co., for delivery next July. The vessel will be 145 ft. long, 24 ft. beam and 18¼ ft. deep, equipped with triple-expansion engines, cylinder diameters 12½, 21 and 34 in., with a stroke of 21 in.

G. A. Tomlinson, Duluth, has given an order to the Superior Ship Building Co., for a barge to be approximately 100 ft. long and 30 ft. beam and to be fitted out with a blacksmith shop, electric welding machinery and tools for repair work. The barge will be self-propelling and is intended to be used as a kind of floating repair shop in the harbor.

Oil barge No. 85, building for the Standard Oil Co., was launched at the Lorain yard of the American Ship Building Co., on Jan. 25. The barge is of Canadian canal dimensions and is 260 ft. over all, 250 ft. between perpendiculars, 43 ft. beam and 25 ft. deep.

An order has been given to the Great Lakes Engineering Works by the C. H. Little Co. of Detroit for a new steel sand steamer to be 160 ft. over all, 35 ft. beam and 14 ft. deep.

The Toledo Ship Building Co., Toledo, O., have been given contract for a ferry steamer for Detroit river service to be 110 ft. long and to operate between Detroit and Walkerville.

The American Ship Building Co. will build a drill boat 140 ft. x 35 ft. x 8 ft., at Detroit for the Starke Dredging Co. of Milwaukee.

Commerce of Detroit River

From April 19 to Dec. 16, a period of 242 days, 25,238 vessels passed through the Limekiln Crossing at the mouth of the Detroit river. The Livingstone channel was opened to navigation on Oct. 19, and from that date to the close of navigation, 1,227 vessels used the new channel, making a total of 26,465 vessels that passed through the Detroit river during the season of 1912. The commerce carried by these vessels is estimated at 95,000,000 tons.

The eight-hour dredge workers' bill has passed the senate and is now a law. It means that dredging contractors engaged on government work can only employ their workmen eight hours a day. On the lakes where the season is short, this will make a double shift necessary. Present contracts will be concluded on the old basis, but all contracts for new work will have to be figured upon an eight-hour shift, practically increasing costs one-third.

The annual meeting of the grand lodge of the Ship Masters' Association was held in Washington on Jan. 23, and the following officers were elected: Captain M. M. Stewart, Algonac, Mich., grand president; Capt. Charles Autterson, Detroit, grand first vice-president; Capt. J. A. Holmes, Cleveland, grand secretary; and Capt. H. A, Murphy, grand treasurer.

WITH THE LEGISLATORS

REPRESENTATIVE William E. Humphrey, of Washington, largely through whose instrumentality the present investigation into the operations of the foreign shipping combination is being made, has introduced a bill in the house of representatives denying the use of the Panama canal to all ships belonging to any combination in restraint of interstate or foreign trade. Obviously the measure is far-reaching since it embraces not only foreign steamship lines, but American steamship lines as well. The exact language of the measure is:

"That no vessel of the United States or of any foreign nation shall be permitted to enter or pass through the Panama canal that is under the control of, or operated by, or that is used, run or operated in any combination, conference, pool or ring, that is monopolizing or attempting to monopolize interstate or foreign commerce of the United States or any part of such trade or commerce or doing any act or acts in restraint of such trade or commerce."

Mr. Humphrey is eager to have the necessary legislation enacted before the canal is opened to commerce. His proposed measure is the biggest thing that has as yet been attempted for the development of a free and independent American merchant marine. Mr. Humphrey contends that the evidence already submitted at the hearings before the committee on merchant marine and fisheries absolutely proves that a combination does exist among foreign steamship lines in restraint of trade and that it is utterly impossible for an independent line to get any of the business. They fix freight rates by agreement; they put on so-called "fighting ships" and will slash the rate to a given point whenever an independent line seeks to enter that particular field. This fact appears to have been quite firmly established by the testimony of A. H. Bull, who sought to project a line to Porto Rico, but every week in which he scheduled a sailing, freights to Porto Rico were reduced beyond all hope of profit for that week and in that way competition was absolutely stifled. The merchants and manufacturers of this country are totally at the mercy of the foreign steamship lines in developing export trade. If Mr. Humphrey's measure should pass, however, it would mean that every shipyard in the United States would be working overtime producing ships.

* * *

Congressman J. Hampton Moore, of Philadelphia, has introduced a bill in the house of representatives, to repeal that part of the Panama canal act which permits the importion into this country of free materials, for ship construction and equipment. This particular paragraph reads as follows:

"That all materials of foreign production which may be necessary for the construction or repair of vessels built by the United States, and all such materials necessary for the building or repair of the machinery, and all articles necessary for their outfit and equipment, may be imported into the United States, free of duty under such regulations as the secretary of the treasury may prescribe."

We have repeatedly said in these columns that this is a very good provision to repeal.

* * *

Senator Nelson has introduced a bill in the senate to amend the Harten act in order to make ocean-going vessels liable for cargo resulting from negligence or faults in management or errors in navigation. In efficacy of his measure, Senator Nelson referred to the Titanic disaster as a case in which cargo owners fared badly, due to the exemption from liability in the Harter act. Senator Nelson does not intend that his amendment shall apply to the lakes, but as there is nothing in the bill to indicate such exemption, President Livingstone and Harvey D. Goulder, of the Lake Carriers' Association, had journeyed to Washington to protest against it. The bill is not favored by steamship interests generally, who believe it to be purely a controversy between underwriters, one representing those who underwrite the cargo and the other, those who underwrite the ship. Their contention is that the shipper invariably insures his cargo and that if the shipowner is to insure its safe delivery also, it will mean double insurance, which in turn will mean higher charter cost of steamers and higher cost of goods delivered.

* * *

There is little or no prospect of the Wilson seamen's bill passing congress at the present session. This measure, if passed, would have made it necessary to increase the crews aboard American vessels by 33 per cent. Some of the most preposterous statements were made by the labor unions in support of the measure, as for instance, that the crews on lake steamers were compelled to work at times from eighteen to thirty hours without rest. The bill if passed would have worked a very grave hardship to lake owners as it would have made necessary the construction of additional deck houses to accommodate the added members of the crew.

Nor is there now any prospect that the Hardy bill will pass at the present session. This bill sought to require all vessels of 1,000 tons and

over to carry three licensed mates. At present these vessels carry two.

Capt. Charles L. Hutchinson, of Cleveland, appeared in opposition to this bill and made quite a point in saying that his ships, costing on an average of $400,000 each, were operating without insurance and that assuredly he had their safety more at heart than anyone else and certainly would not do so foolish a thing as to send them out short-handed.

Isherwood System of Construction*

In Which the Author Deals With the Shell Plating

By Robert Curr

SHELL PLATING: On the great lakes the outside plating is very important for the reason that eighty per cent of the plating is laid out on the mold loft floor.

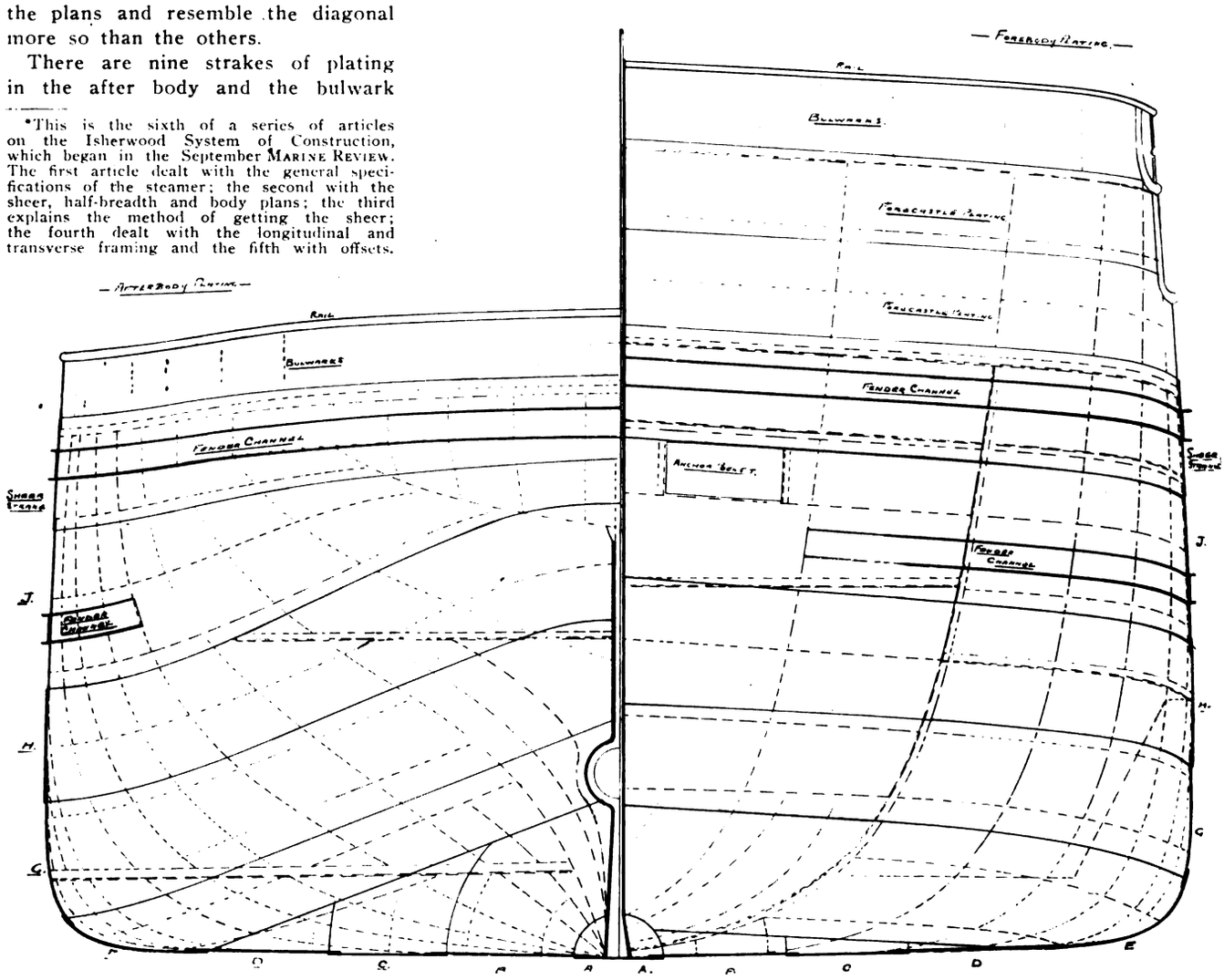
The accompanying plan with this article shows the plating on the mold loft floor which completes the body plan on the floor.

The heavy lines show the plate edges faired up after being through the process of the level lines. Unlike the other lines they are curved in all the plans and resemble the diagonal more so than the others.

There are nine strakes of plating in the after body and the bulwark plating, viz.; Keel A, garboard B, C, D, lower bilge E, upper bilge G, H, J, sheer and bulwarks. The strakes C and D are the only ones which do not end on the stern post or reach that length but end on the lower edge of the lower bilge strake E. The full lines on strakes J and sheer show channel for fenders and the two lines on top of bulwarks represent two half rounds, one inside and the other out, forming a 3 in. round when completed. The dotted lines on the bulwark plating show the position of the stiffeners. The balance of the dotted lines show the tank side, after peak deck, transverses and longitudinal frames, explained in an earlier article. The heavy line on the stern post is the flange of the shell plating to same.

The fore body shows two extra strakes of plating which run the length of the forecastle and goes by the forecastle plating; the strake on top is the forecastle bulwarks which

*This is the sixth of a series of articles on the Isherwood System of Construction, which began in the September MARINE REVIEW. The first article dealt with the general specifications of the steamer; the second with the sheer, half-breadth and body plans; the third explains the method of getting the sheer; the fourth dealt with the longitudinal and transverse framing and the fifth with offsets.



AFTERBODY PLATING AND FOREBODY PLATING

is completed similar to the bulwarks aft.

The channel fenders are shown on the same strakes as the after end, the lower one stopping short of the anchor pockets. The shell plating strakes B, C, and D, stop at the lower bilge seam, while the others run to the stem and flanged to same as shown by heavy line on stem.

The longitudinal frames being faired as explained in an earlier article, the plate lines can be run parallel to same and found all that is required.

The usual way to get the plate lines is to make a model and run in the shell plating on it. The model is made to a quarter of an inch to the foot or forty-eight times smaller than the vessel itself.

After the lines have been satisfactorily faired up, the widths between the outside plate edges are measured around the frames and given to the loftsman in tabulated form. Even with the offsets transferred from so small a scale as a rule, the lines are fairly accurate when finished full size.

The model for this vessel measures in length 50.75 inches, width, one side, 5 inches and depth 4.5 inches.

The edges of the outside strakes of plating are termed sight edges because these edges are seen and any unfairness spoils the appearance of the ship's side.

This style of plating is termed the raised and sunken strakes, the half of same being inside and the other half outside.

This arrangement shows the keel outside, B inside, C outside, D inside, E outside, G inside, H outside, J inside and sheer strake outside.

The top of the sheer strake is above the spar deck stringer bar, enough to form a lap for the bulwark plating. A great deal of care is taken with the top of the shear strake, for it is the most important of all the strakes.

The top edge of the sheer strake gives the finishing touch to the outside of the vessel and any irregularity is plainly seen and remains an eyesore for all time.

The Lorenzo, a steamer building for the New York & Porto Rico Steamship Co., was launched on Saturday, Jan. 25, at the yard of the Newport News Ship Building & Dry Dock Co., Newport News, Va. She is the fourth steamer to be built at this yard for the New York & Porto Rico Steamship Co. from designs by Theodore E. Ferris, New York.

Ross Schofield System of Circulation

The Ross Schofield system of circulation for marine boilers presents many novel features in this kind of apparatus. It is a well-known fact amongst engineers that the Scotch boiler so largely used in marine practice has one serious defect, poor circulation of the water, which is the cause of probably 80 per cent of the troubles experienced with this boiler, necessitating almost continual repairs, which, in time, come to be of very extensive nature, and it has for years been a problem which has exercised many men in the engineering profession to devise means for promoting better circulation in this boiler.

Apparatus for this purpose has generally been designed to utilize the well-known principles of convection, namely that on the application of heat to water the warm water being then of less specific gravity than that by which it is surrounded will ascend while the relatively cooler water will descend, generating currents in the body of water, so that if such currents are suitably confined, the warmer water in the upper parts of a boiler rising will be replaced by relatively cooler water from below.

Energy of Rising Bubbles

But as such apparatus depends for its action on the difference of temperatures in the upper and lower parts of a boiler, and the object sought is to minimize this difference, such devices tend to defeat the means of their own operation.

The Ross Schofield system depends for its action on a distinctly different principle, namely, the energy of rising steam bubbles. It is a familiar sight in the boiling of a kettle of water to see the steam bubbles as they rise through the water enlarging in size and increasing in velocity, and as they finally burst to the surface, lifting considerable quantities of water into the space above.

This is the action which takes place in a steam boiler. The steam bubbles after being formed on the heating surfaces, rise through the water with considerable speed and energy, carrying quantities of the surrounding water with them, and as they are freed from the surface, projecting this water into what in the steam boiler is designated as the steam space.

This action is known as priming and is often the cause of considerable anxiety on the part of the engineer in charge, as if such water in the steam space is carried away in the steam pipe, it is always the source of great waste of heat, and may be the cause of serious damage to the engine.

It is then the object of the Ross Schofield system applied to boilers to utilize this energy of the rising steam bubble and apply it to useful purpose in promoting a proper circulation of the water.

This is accomplished by fitting plates at the sides of the combustion chambers, from the combustion chamber to the back head, and extending from above the combustion chamber down to a suitable distance from the bottom. It will thus be seen that a channel is formed behind the combustion chamber and that as steam bubbles are formed on the back plate and rise in this channel carrying the water with them, the displaced water must be replaced from the bottom. At or a little above the top of the combustion chamber, another plate is placed horizontally and extending from one to the other of the side plates. This plate is set on an angle leaning toward the front of the boiler so that as the steam and water rise from the back of the combustion chamber, they strike this hood plate and instead of rising vertically into the steam space, are thrown forward in the boiler in a horizontal direction. Plates are also fitted at the back tube sheet on each side extending forward from the tube sheet a distance of about 12 in. and being joined above by another hood plate, similar to that over the back of the combustion chamber, similarly directing the currents which are generated on the back tube plate. There are thus two parallel streams being projected by the energy of the steam bubbles in a horizontal direction on the surface of the water toward the front head, constantly drawing the water from the lower parts of the boiler, and maintaining a constant, regular and effective circulation of the water in all its parts.

Two Striking Results

The horizontal direction of these currents has two very striking results: First—in the formation of the steam bubbles on the heating surfaces when no circulator is fitted, the bubbles cling for a time to the surfaces until their decreased specific gravity is such as to overcome the capillary attraction which causes them to adhere to the plate and they leave it and rise to the surface. Now, while such bubbles are clinging to the surfaces, they form a resistance to the passage of heat from the plate, 40 times more than is offered by water, and this is one of the points where the striking economy of the Ross Schofield system asserts itself, for the horizontal direction of the currents over tubes and furnace crowns, by keeping these bubbles continuously swept off the surfaces and constantly bringing fresh water in contact with them the rate of evaporation is largely increased. Second—The

deflection of the water in a horizontal direction at the surface prevents the water being carried into the steam space by the bursting steam bubbles (priming) and thus greatly reducing the quantity of water carried away into the steam pipes.

This fact was very clearly demonstrated in the case of the S. S. Cambrian, of the Leyland line, where, before fitting this system, the engines were developing 2,900 H. P., and the feed pumps operating at 27 strokes per minute, and after the system was fitted, the engines developed 3,300 H. P. with the feed pumps operating at 24 strokes per minute. Such a result could only be due to the fact that priming was stopped, thus making this increase of power possible on a decreased supply of water. The engineer's report in the above case showed a saving of 180 tons of coal on the round trip between London and Boston.

Structure Not Affected

The installation does not in any way affect the structure of the boiler, offers no obstruction in any parts of the boiler requiring to be kept under observation, offers no parts on which sediment or dirt can collect, cannot become clogged up with sediment and get out of order, has no parts which have to be operated or require attention, cannot be interfered with, can be entirely forgotten and still continues to work, for it is entirely automatic, and is entirely and absolutely fool proof.

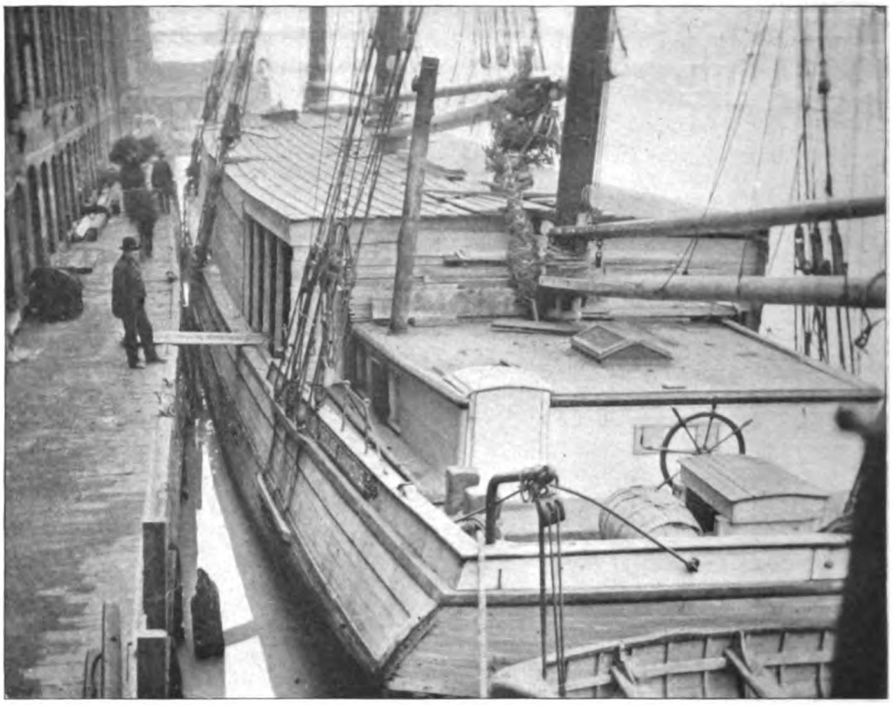
It is not a temperature balance and does not depend upon differences of temperature for its operation, but it maintains a constant and perfect circulation of the water and of necessity must maintain all the water at as nearly a uniform temperature as is practically possible.

Finally, in addition to the results of operation enumerated above, tending for the most part to a substantial economy of coal, the maintenance of the perfect circulation and a uniform temperature result in the disappearance of many of the familiar troubles in Scotch boilers requiring the constant attention of the boiler makers, such as fire cracks at seams of furnaces and combustion chambers, leaky seams at lower parts of shells and heads, leaky stay-bolts and tube ends, cracking of flanges of heads, furnaces and combustion chambers, pitting of lower parts of furnaces and combustion chambers and many others, and a substantial reduction will be found in the bills for such repairs, and the life of the boilers so fitted will be materially lengthened.

A working model of a Scotch boiler fitted with this device is on exhibition at the office of Alexander Hynd, 872 Rockefeller building, Cleveland, and is being demonstrated to all who may be interested.

Schooner Rouse Simmons

Were it not for the fate that befell the little schooner, Rouse Simmons, the loss of lives on the great lakes during 1912 would have been only seventeen. As it is, it was thirty-three. Practically one-half of those who lost their lives during the season were in the little schooner. She was caught in the gale raging on Lake Michigan on Dec. 4, and never reached port. The revenue cutter Tuscarora searched for her for days but found no trace of her. She carried a cargo of Christmas trees and these are now, owing to the mild weather and absence of ice, beginning to drift ashore. The Simmons was in command of Capt. Henry Schueneman and carried a crew, all told, of sixteen men.



SCHOONER ROUSE SIMMONS, WHICH FOUNDERED IN LAKE MICHIGAN

Lumber Carriers' Association

No business of any importance was transacted at the annual meeting of the Lumber Carriers' Association at Detroit on Jan. 14. Most of the association's lumber loading contracts with labor organizations continue in force for another year. Part of the contracts for unloading are to be renewed during the coming spring, including those at Chicago, Buffalo, Tonawanda and Detroit, but these will be taken up later by committees. The report of Secretary W. D. Hamilton, of Chicago, shows that 140 vessels aggregating 62,000 net tons are enrolled in the associotion.

Officers were re-elected as follows: E. L. Fisher, Cleveland, president; O. W. Blodgett, Bay City, Mich., first vice president; Fred P. Potter, Cleveland, second vice president; W. E. Holmes, Chicago, third vice president; W. D. Hamilton, Chicago, secretary and treasurer.

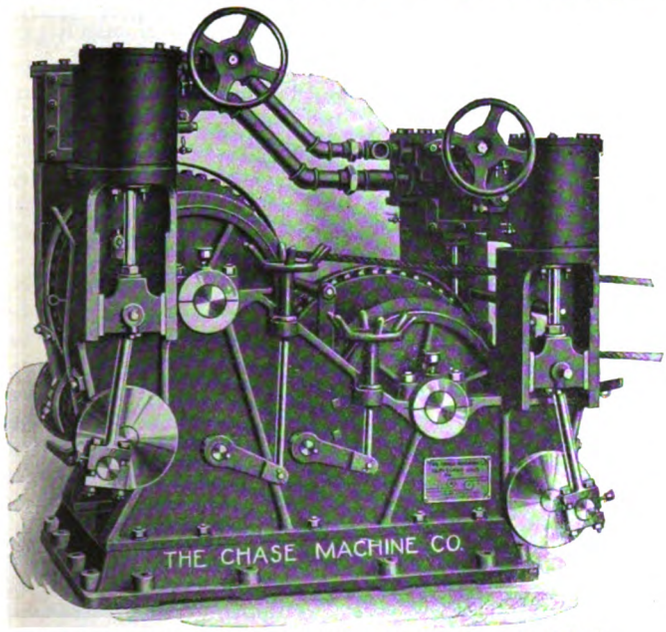
The board of directors consists of E. E. Teare, H. L. Wilton, W. E. Holmes, Fred P. Potter, O. W. Blodgett, W. D. Hamilton, H. H. Hettler, J. O. Nessen, V. P. Nashek, D. W. Mills, William Schlosser, Charles S. Neff, H. R. Havey, E. B. Foss, T. R. Handy, J. C. Garey, J. J. Boland, C. H. Weeks, George F. Bell, E. L. Fisher, Edward Hines, C. H. Prescott Jr., Myron Blodgett, W. H. Sharp, L. W. Skeele, C. Raithborne, H. A. Haigh and R. A. Pringle.

The executive committee consists of W. H. Sharp, E. E. Teare, E. L. Fisher, W. D. Hamilton, W. E. Holmes, C. H. Prescott Jr., O. W. Blodgett, Edward Hines, H. R. Havey, George F. Bell, J. C. Garey and Myron F. Blodgett.

Roy M. Wolvin, of Winnipeg, as trustee has bought the steamers Saturn and Uranus of the Gilchrist Transportation Co. These vessels were built in 1901 and are 346 ft. keel, 48 ft. beam and 28 ft. deep.

Rankin Mooring Machine

A new and improved mooring machine has been invented by A. P. Rankin, of Cleveland, formerly chief engineer of the American Ship Building Co., and now a member of the firm of Logan & Rankin, consulting engineers and naval architects, and it is illustrated and described herewith for the first time in any publication.



RANKIN TWO LINE MOORING MACHINE, SIDE VIEW

The rapidity of loading and unloading freight at great lakes harbors led to the development of the mooring machine or docking engine, and the rise and fall of the tide at salt water ports has occasioned their growing use on ocean vessels.

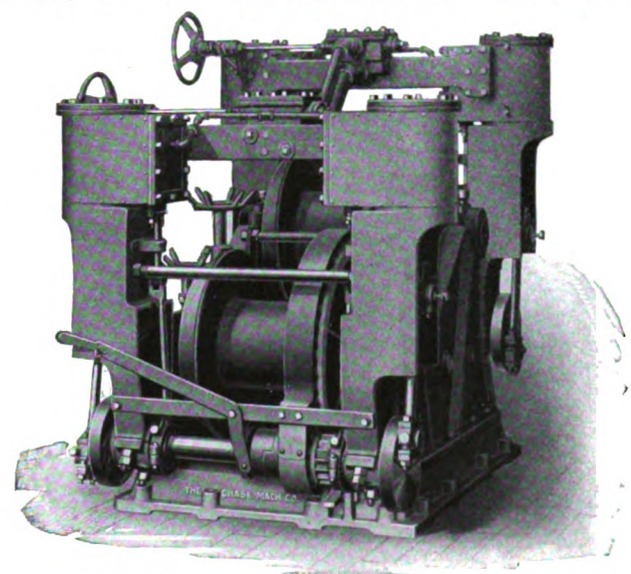
The drums usually carry each about 400 ft. of flexible wire hawser, ⅞ to 1⅛ in. in diameter, used to assist in shifting position at dock, or in locking through the canals, but chiefly to hold the vessel tight against the dock at all times, irrespective of changing deck level and without attention.

Steam is left turned into the engine, which is set to wind in line, and keeps the lines taut, paying out or winding in slightly as the vessel rises or falls, and the suction or wave from a passing vessel is automatically cushioned by the steam, preventing the parting of lines or shifting at dock and resultant damage to cargo handling apparatus.

Up to the present time the arrangement almost universally adopted has been to use two separate single drum machines forward and the same number aft, these being placed as close to the center line of the ship as possible and sufficiently out of line with each other in a fore and aft direction to allow the wire line of one engine to pass clear of the framing of the other. Each engine is provided with a roller chock on either side of the ship, making four chocks forward and four aft.

A better arrangement of hatches would often be possible if the room required in afore and aft direction, by the mooring machine could be reduced, and in the reconstruction of old steamers it is often exceedingly troublesome and sometimes impossible to get the desired arrangement of hatches and install the customary type of mooring machines. In the new type of machines here illustrated the drums are operated entirely independently of each other, and driven by separate double cylinder reversible engines, but are mounted tandem-wise at different heights on the same frame, so that the line from one drum passes freely over or under the other drum, according to which side of the vessel is against the dock. The engines are of the vertical type, not only tending to compactness and accessibility but giving better drainage and keeping the working parts up out of the coal and ore that unavoidably gathers around them. The reversing and brake wheels are handy for the operator, one man working both drums without difficulty. The new type machine occupies no more space fore and aft than a single machine of the pair required for the same service under the old arrangement and requires only half the number of roller chocks.

The illustrations are from photographs of the pioneer machines of this type, installed by Babcock & Penton, consulting engineers and naval architects, on steamers of the Erie Railroad Transit Line, undergoing extensive repairs under their direction at Buffalo. The machines were built by the Chase Machine Co., Cleveland, under patent protection applied for by Mr. Rankin.


RANKIN TWO LINE MOORING MACHINE, END VIEW

Old Frigate Santee

Henry A. Hitner's Sons Co., Philadelphia, dealers in scrap iron, metals, etc., recently purchased the old frigate Santee for $3,610 from the navy department. The Santee has been stationed at Annapolis for nearly half a century, as a prison ship for midshipmen who disregarded the rules of the naval academy. She is one of the very few wooden vessels of the navy still afloat, having been laid down in 1820.

The lake steamer Minnie E. Kelton, which was sold to Pacific coast interests a couple of years ago, is now being remodeled into a steam schooner at the Supple ship yard at Portland, Ore., for the Pacific Steamship Co. Her identity will be completely lost to lake interests in her new name Rochelle.

W. C. Richardson & Co., who have occupied quarters as vessel agents in the Perry-Payne building, Cleveland, for 25 years, will move into the new Leader-News building in March.

The steamers Mohawk and Iroquois of the Manhattan Navigation Co.'s fleet will each be given an additional deck and equipped with oil burners this winter at the Harlan & Hollingsworth Co.'s yard, at Wilmington, Del.

With the Auxiliary Makers

McNab Nautical Specialties

The McNab Co., manufacturers of nautical and engineering appliances, Bridgeport, Conn., had quite a display at the recent meeting of the Lake Carriers' Association in Detroit. The McNab indicator is of course well known, as it has been quite liberally installed on ocean-going and lake vessels since it was put on the market two or three years ago. The company had, however, on exhibition two instruments that are decidedly new.

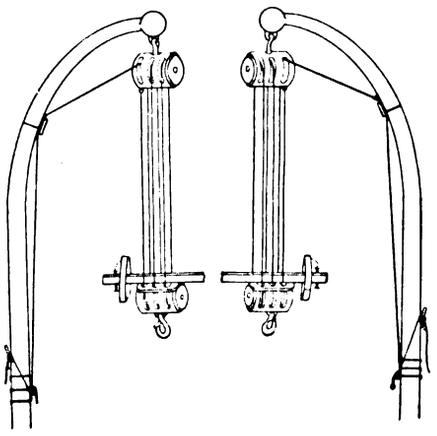
One of these, the McNab frigidometer, has been put on the market since the Titanic disaster. Its purpose is to constantly take the temperature of the sea and register in the pilot house any sudden changes. The frigidometer is a most unique instrument operating in reverse of the ordinary thermometer, its mercury ascending with cold and descending with heat. When the contact arm is set at any given degree, say 45, and the temperature of the sea shall correspond, the contraction of the liquid raises the mercury into contact with a platinum wire, corresponding to this temperature, and a circuit is established. A powerful gong is set going and will continue until the contact arm is moved by an officer to the next lower indicated temperature. The frigidometer has been installed on the Mauretania of the Cunard Line and has already proved quite serviceable.

Another device entirely new is the McNab draught gage. When placed in the chart room it will give information as to the actual draught forward, aft and amidships and also automatically indicate during loading any actual list which the steamer may have to port or starboard. The draught gage consists of U-shaped glass tubes mounted within a double frame, to which indicating dials are attached. At the bottom of the frame is mounted a spirit level and indicating pointer normally fixed at zero. Within the glass tubes mercury is contained while one end of each is extended and connected to copper tubes that are coiled within the frames, permitting the adjustment to level readings by swinging to either side. Small pipes are inserted through the ship's side, forward, aft and amidships, being connected to separate small tanks or chambers within the hull. Suitable piping is installed between these chambers and the instrument. When water is admitted to the chambers the air within the pipes is compressed and exerting its energy in the line of least resistance, forces the mercury within the tubes to balance the water pressure, thus indicating on the dials in feet and inches the draught. A draught gage of this sort should prove invaluable to the shipowner.

Anti-Twisting Boat Tackle

An exhaustive test was recently given on the steamship Vaderland of the Red Star Line while lying at her dock in the North river, New York, of the Star non-toppling and anti-twisting boat tackle device invented by Capt. James Raymond, the inventor of the Raymond releasing hook, 8 Bridge street, New York.

The device is illustrated in the diagram published herewith. To the ordinary lower block of the tackle



NON-TWISTING TACKLE

a cap is fitted to the top of the block with three holes on each side, through which the falls are rove, as well as through the sheave holes of the lower block which is intended to keep the block from capsizing. In addition to that device a wooden scantling or strong-back passes from one lower block to the other through the tackle, intended to prevent the tackles from twisting. Capt. Raymond has just applied for a patent on this strong-back and it is his intention to furnish it free in connection with the Star non-toppling block.

Three Engelhardt lifeboats, each 29 ft. x 9 ft. x 3 ft., were lowered from the boat deck of the Vaderland into the water and unhooked and the tackles rounded up and ready to launch a fourth boat in nine minutes and thirty seconds. The distance from the boat deck to the water was about 50 ft. Three and three-quarter inch Manila rope falls were used with triple blocks.

The first Engelhardt boat, being suspended inboard from the davits, was lowered to the water and unhooked in one minute and forty-five seconds. The davit tackle was then rounded up and the second boat hooked on in one minute, fifteen seconds. The second boat was then lifted and lowered to the water in one minute and fifty seconds. After the fall was again rounded up the third boat was hooked on, lifted and lowered to the water and unhooked in two minutes, five seconds. Throughout the tests the tackles were kept clear of all twisting of the falls or capsizing of blocks. The Raymond releasing hooks were used in the test.

Propeller Thrust Bearings

The Standard Roller Bearing Co., Philadelphia, Pa., has just issued a catalog descriptive of its propeller thrust bearings for use on ships, a device which has been in successful service for more than ten years. This company is the largest manufacturer of anti-friction bearings in the country. The advantages claimed for these bearings over the ordinary marine type of thrust bearing are as follows: A guaranteed reduction in fuel consumption of from 5 to 10 per cent while the vessel maintains the same speed: an increased speed of vessel with the same fuel consumption; saving in the amount of lubricating oil used: no cooling water system required either in the shoes or oil bath; bearings never heated under the most severe service.

Pipe Cutting Machine

The Toledo Pipe Threading Machine Co., Toledo, has just put on the market a pipe cutting machine for

hand operation, which will readily cut off pipe from 2½ to 6 in. inclusive. The cutting is done by four knives which are automatically fed by star feed. Two of these knives are bevelled across the edge and cut out a V-shape section of the pipe; the other two knives are square and follow in the V-shape cut and sweep out the edges, thus eliminating any tendency the knives might have to bind in the cut. It has been practically impossible to cut off any extra heavy or double extra heavy pipe with any previously existing hand cutter. These conditions do not affect the working qualities of the new Toledo cutter in any respect; it merely takes a longer time to cut through the walls of extra heavy pipe than it does to cut standard pipe.

McArthur Portable Ladder

Vessel owners who have inspected the McArthur portable fire escape are much impressed with it. This ladder, which is made out of galvanized steel wire, possesses great strength and

McARTHUR PORTABLE LADDER

lightness and is adaptable for a great many uses aboard ship, being much safer and more convenient than the ordinary rope ladder for going over the ship's side. It can be rolled up very compactly when not in use, and will take up very little space in the dunnage room. The ladder is practically indestructible and can be manufactured to any required length.

Automatic Machine Screw Co.

The Standard Automatic Machine Screw Co. will in a few weeks erect a steel, concrete and brick factory building on Superior avenue east of Fifty-fifth street, Cleveland, for the manufacture of automatic machine screw products for automobiles, telephones and other things. The new building will be four stories high, 100 by 110 ft. The ground floor will be occupied by stores and such part of the building as is not occupied by the machine screw company will be rented out for light manufacturing purposes. John M. Mulrooney, well known in lake circles and the former publisher of THE MARINE REVIEW, is backing the enterprise. Associated with him are M. P. Mooney, M. J. Gleason and Edward Burke. The machine screw company has been doing work in a small way at 457 Prospect avenue, Cleveland.

Fire Extinguishing Apparatus

The American-Hawaiian steamship Minnesotan, one of the eight vessels building for this company by the Maryland Steel Co., will be equipped with the fire extinguishing and fumigating apparatus manufactured by the Fumigating & Fire Extinguishing Co., of America, 29 Broadway, New York. The gas machine is placed in a steel deckhouse, 8 ft. x 13 ft., located on the upper deck just abaft the smokestack; from this a main discharge pipe, 3 in. in diameter, extends on the starboard side of the vessel forward and aft under the shelter deck. The main pipe leads to six manifolds, all of which are in the shelter deck, accessible at all times and securely protected, from which, 2½-in. branch pipes extend to each deck in each hold of the vessel. All of the branch pipes lead to within 2 ft. of the floor of the compartments. The vertical branch pipes are laid well up against the bulkheads or against the face of the longitudinals or frames at the ship's side and are securely protected with wood casings. All of the piping is of galvanized iron and fittings are avoided wherever possible, bends being substituted. While a separate pipe line for this gas is usually provided, a combined gas and steam installation has been worked out in the case of the Minnesotan, but all pockets where condensed steam could collect have been eliminated and there is always a free flow for water to the drains provided so as to keep the pipes as dry as possible for the gas. All of the branch lines are controlled by manifold valves so that gas or steam may be forced into any compartment of the ship where it may be required and, in addition to this, there are hose connections forward and aft, so that gas may be used for fumigating the crew's quarters. The gas used is sulphur dioxide, the efficiency of which in extinguishing fire and vermin is well known. Air is pumped into the furnace where the gas is generated and the gas discharged under pressure so that it does not come in contact with the blower outfit.

Engberg's Products

Engberg's Electric & Mechanical Works, St. Joseph, Mich., have recently put out two pamphlets—one devoted to their searchlight projectors and the other to their direct-connected generating sets. The general appearance of the searchlight is good. The carbon feeding mechanism is very simple but it maintains an absolutely perfect uniform arc and provides a steady beam of light. Sticking of the lamp is impossible as the carbon holders are pivoted on the lower ends, doing away with slides which usually cause sticking. An automatic cut-off is provided to break the current to the feed coil, thereby stopping the feed, should the operator neglect to pull the switch when carbons are consumed to a safe distance from the carbon holders. The generating sets exhibit great freedom from complication and all parts are accessible and easy of adjustment.

New Automatic Stoker

The Sanford Riley Stoker Co., Ltd., Worcester, Mass., is now placing on the market a new automatic stoker of the underfeed type with self dumping feature, having a mechanical movement of the fuel-bearing surfaces and causing constant rather than periodic cleaning. The makers claim that the stoker takes up less space than any other of equal capacity and also requires less head room than other types.

Since the Titanic disaster many minds have been at work upon the problem of life-saving at sea. John G. Luptack, 815 East Fifth St., Los Angeles, Cal., has invented a life-saving suit in which the entire person is encased. It is water-proof and water-tight and flotation is secured by an interlining of corks and cubes. The suit is worn in the same manner as ordinary clothing and will enable one to float for a long time.